

AD-A164 063

"CONVERSATIONS WITH A STUKA PILOT"

CONFERENCE FEATURING
PAUL-WERNER HOZZEL
BRIG. GENERAL (RET.), GERMAN AIR FORCE
AT
THE NATIONAL WAR COLLEGE

NOVEMBER 1978

SPONSORED BY
CONTRACT No. DAAK40-78-C-0004
MIPR No. FY7615-78-05106

DTIC
ELECT
FEB 13 1986
A

This document has been approved
for public release and sale; its
distribution is unlimited.

DTIC FILE COPY

BATTELLE
COLUMBUS LABORATORIES
TACTICAL TECHNOLOGY CENTER
505 KING AVENUE
COLUMBUS, OHIO 43201

86 2 12 0

1.

"CONVERSATIONS WITH A STUKA PILOT"

CONFERENCE FEATURING

PAUL-WERNER HOZZEL
BRIG. GENERAL (RET.), GERMAN AIR FORCE

AT

THE NATIONAL WAR COLLEGE

NOVEMBER 1978

SPONSORED BY

CONTRACT No. DAAK40-78-C-0004
MIPR No. FY7615-78-05106

DTIC
ELEC
FEB 13 1986
A

This document has been approved
for public release and sale; its
distribution is unlimited.

BATTELLE

COLUMBUS LABORATORIES
TACTICAL TECHNOLOGY CENTER
505 KING AVENUE
COLUMBUS, OHIO 43201

DTIC FILE COPY

86 2 12 004

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1. ADA 164 063	
2a. SECURITY CLASSIFICATION AUTHORITY --		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE --		5. MONITORING ORGANIZATION REPORT NUMBER(S) --	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) --		6. NAME OF MONITORING ORGANIZATION U.S. Army Missile Command	
6a. NAME OF PERFORMING ORGANIZATION Battelle-Columbus Laboratories Tactical Technology Center		6b. OFFICE SYMBOL (If applicable) --	
6c. ADDRESS (City, State and ZIP Code) Columbus, Ohio 43201-2693		7c. ADDRESS (City, State and ZIP Code) Redstone Arsenal, Alabama 35898-5280	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION A-10 System Program Office Aeronautical Systems Div.		8b. OFFICE SYMBOL (If applicable) --	
8c. ADDRESS (City, State and ZIP Code) Wright-Patterson Air Force Base, Ohio 45433		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Contract No. DAAK40-78-C-0004 AFR No. FY7615-78-05106	
11. TITLE (Include Security Classification) "CONVERSATIONS WITH A STUKA PILOT"*		10. SOURCE OF FUNDING NOS. PROGRAM ELEMENT NO. PROJECT NO. TASK NO. WORK UNIT NO.	
12. PERSONAL AUTHOR(S) Brigadier General (Ret.) Paul-Werner Hozzel			
13a. TYPE OF REPORT Special		13b. TIME COVERED FROM -- TO --	
14. DATE OF REPORT (Yr., Mo., Day) 1978 November		15. PAGE COUNT 139	
16. SUPPLEMENTARY NOTATION *Conference Featuring Paul-Werner Hozzel, Brig. General (Ret.), German Air Force, at the National War College, November 1978			
17. COSATI CODES FIELD GROUP SUB GR 15 7		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Airborne, Battles, Military Aircraft, Logistics, Anti-Tank Weapons, Air Force, World War II, Pilot, Warfare Operations, Germany, Air Operations,	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) In this document German Air Force Brigadier General (Ret.) Paul-Werner Hozzel, presents some of his experiences as a Stuka pilot and commander of Stuka units, organizer of the Luftwaffe Air Fleet.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS <input type="checkbox"/>		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL Mr. James Cashatt		22b. PHONE NUMBER (513) 255-3256	
		22c. OFFICE SYMBOL ASD/TAA	

DISCLAIMER

The views and conclusions expressed in this document by General Hozzel and others are their own and should not necessarily be interpreted as representing the views of the sponsoring agency or Battelle's Columbus Laboratories.

INTRODUCTION

As part of a program to evaluate the lethality of current airborne automatic cannon ammunition against threat armored vehicles, the Wayne H. Coloney Company invited ³former Brigadier General Paul-Werner Hozzel, German Air Force, to present some of his experiences in combat in the Second World War. General Hozzel presented his ideas and recollections in a one-day seminar at the National War College to members of the alumni association and other distinguished guests. Two days later, at the invitation of Professor R.H.S. Stolfi, Naval Postgraduate School, he gave a similar seminar to students and faculty at Monterey, California. The seminar participants and audience varied markedly and included officer students at the Naval Postgraduate School, active-duty Air Force general officers, retired Admiral Arleigh Burke, USN, and the Director of Net Assessment for the Department of Defense.

General Hozzel is one of a few remaining German officers who fought in the Second World War and held position high enough to allow generalizations about the war and to extract historical genre for future operations. As such, he represents a perishable source for the defense of the West, who along with a dwindling band of German officers in their 70's and 80's, can provide insights into the war from the opposing side and present experience and lessons of combat against the Soviets. Hozzel also held several junior positions early in the war which were singularly varied and give further insight into the conduct of tactical air operations and guidance for present-day tactical and weapons development.

Due to special circumstances involving the eleventh hour sickness of his commanding officer, Hozzel, as a lieutenant, led a group of Stuka (JU-87) aircraft from East Prussia into combat against the Poles in 1939 in the first Blitzkrieg in modern war. The Blitz, as a modern form of warfare, involves the special combining of infiltration tactics with tanks and aircraft to effect deep, fatal penetration against an opposing side at the beginning of a war. Hozzel led his Stukas against the heavy Polish fortification on the Narwa River line and is credited with breaking them with the most accurate tactical bombing technique of the Second World War--the classic high angle Stuka attack. Hozzel's attack helped to maintain the momentum of the German attack at a time when the Germans could ill afford to mass artillery, infantry, and engineers in a time-consuming, set piece attack against a disintegrating enemy. The present-day application is that tactical aircraft may be used as a substitute for ground-constrained artillery in the fire support role in order to maintain the momentum of an attack.

Hozzel continued on to direct Stuka operations in the first part of the Norwegian Campaign in April-May 1940, largely against British naval and merchant shipping. In June 1940, Hozzel arrived in France to conduct attacks with special ordnance against the Cherbourg fortifications. The Germans had no artillery at the time with their mobile formations which could master heavy fortification. Hozzel then went on to conduct Stuka attacks against targets in southern England, attacks in support of the Afrikakorps

in North Africa in 1941, and massive strikes against British shipping in the Mediterranean and against Malta in the same year. In all of the areas described--France, England, the Mediterranean--he held commands far above what his rank would have allowed in peacetime. The lesson, along with the dramatic accuracy of the Stukas, their success in the face of powerful ground air defense systems, and the difficult maneuvering for any attack aircraft to become adequate fighter screening, was that the German military system emphasized the concentration of resources in elite units which achieved extraordinary results for their numerical strength and logistic effort.

Late in 1941, Hozzel moved to the Eastern Front where he had the distinction as a major, later in 1942, to command the famed Immelmann Wing. The Wing was reinforced to compose over 200 aircraft in support of the 6th Army and its advance toward Stalingrad in August 1942. Using special tactics and weapons, the your major led the Immelmann Wing in successful attacks against the Soviet tanks in the Kalalath region west of Stalingrad. Later in the year, he initiated the dive bombing operations against the heavy Soviet fortifications in Stalingrad through the dense air defense network screening the city. At the end of 1942, Hozzel conducted defensive air operations against the great Soviet offensive which drove the Germans back to the Central Ukraine. His last operation as a commander of Stuka units was during Operation Citadel in support of the southern prong of the German attack near Kursk.

In the period 1943-1944, Hozzel first organized the Luftwaffe Logistics Support Effort in the Ukraine and then, in late 1944, moved to the Northern Front where he ended the war as Chief of Staff of the Luftwaffe Air Fleet supporting the German army group backed up against the sea in the Kurland (Latvian) pocket. These final experiences in combat against the Soviets are particularly instructive. Hozzel organized the logistics effort for the entire German Southern Front which was defending against massive Soviet attacks in late 1943-1944. In Kurland, he experienced massive Soviet offensives intended to crush an entire German army group. NATO forces in Central Europe will be subject to similar Soviet offensives, and the experiences of German officers like General Hozzel in resisting such attacks in Eastern Europe, represent lessons for effective counteractions that can ill afford to be ignored.



Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
AI	

INTRODUCTORY REMARKS

Lt Gen Maurice Casey (USAF Ret.)

I welcome and honor Admiral Burke who is with us here today. Admiral, would you stand up and be recognized please. We have many other distinguished visitors here with us, but I'll let our moderator, Mr Wayne Coloney introduce those. In kicking off our first Alumni Association seminar, I want to thank you for braving the bad weather, particularly General Bruce Clark who came up from the milder climates to be with us and participate in our panel today. I would like now to personally thank the President of the National Defense University, LT Gen Bob Gard. Bob has been most helpful to me, most supportive and cooperative with the Alumni Association. Of course, he gets a lot of this good judgment--he was in the class of '66 National War College. Bob, would you like to give us the official welcome, Sir.

Lt Gen Gard: I would just like to say that, on behalf of all of us at the University, we are very, very pleased indeed with this meeting. As you know, each college under the University umbrella maintains its separate identity and programs. There are some advantages in having the University umbrella over each. One of the activities in which we have been engaged is trying to make this University a National Defense University in fact as well as in name. Among other things, we have used this marvelous facility, and I speak of both buildings collectively to bring together high-level officials from the Defense Department and other agencies of

the Government with knowledgeable people from the private sector to discuss issues on their merits without the necessity of the public official having to defend an institutional position. I think that this is the kind of function a university of this kind ought to perform. We have at this time up in our conference center the Undersecretary of Defense for Research and Engineering, members of his staff, and others in the Defense Department meeting with top-level industry officials exploring some of the issues involved in standardization and interoperability in our NATO Alliance. It is that kind of activity that has been sponsored by the University and the colleges. I feel that the panel we are holding today, sponsored by the NWC Alumni Association, is also especially appropriate because, among other trends in Senior Service College programs, it is an attempt to put the "war" back into the War College. I would confess to you that our Senior Service Colleges, that is, the Army, Navy, and the Air War Colleges, are further along this trail than we are, but we are anxiously eager to deal with questions not just of national strategy but military strategy, questions of resources management at the military level as well as at the department or national level. So this is an especially appropriate conference to remind us that we are indeed still a war college, and the kinds of questions we are exploring here are very, very pertinent to the mission of this University. So, General Casey, thanks a lot for letting me get in my commercial, and I will look forward to seeing you throughout the day. Admiral Barrelle, Commandant of the National War College, will be able to be with you throughout the proceedings.

General Casey: I believe most of you have met Admiral John Barrelle, the National War Commandant, but for those of you who have not, would you please stand, John, and be recognized. This is Admiral Barrelle's first year as the Commandant, and he's not an alumnus of this school, so he's going to bring us a lot of new ideas. He has had considerable experience--Naval Aviator, Naval Line Officer--and I am sure he will give the Navy and the other Services a good indoctrination. John, it is a real pleasure, and we thank you for being with us today. As General Clark said, this is a first, and we are particularly pleased. I will not go into the full detail of the biographies of the people who are with us. I would like to introduce General Hozzel, who came to us from Germany. We are honored and pleased that he could take time from his various activities because, like the rest of retired people, he said there is no retirement, he is just going 100 miles an hour still. General Hozzel was a leader and founder in the Stuka dive bomber tactics. He was a squadron commander, a group commander, wing commander, and participated in many campaigns. He also was a general staff officer and found time to serve as a logistician. So he has a wide variety of experience and, not the least, and certainly not one we would like to participate in, he was a prisoner of war of the Soviets for eleven years. After returning from that ordeal, he joined the modern Luftwaffe and then rose to the rank of Brigadier General and since then retired. He now works in Karlsruhe with an administrative academy. So you can certainly see he has kept very active. We propose to keep this seminar very informal. We want participation. The General will cite the various campaigns

that he personally participated in, giving his personal views as well as what he considered factually happened at that time, and then the panel at the end of each campaign will have an opportunity to ask questions. To bring it up to modern times, General Russ from Tactical Air Command will present a little film of five minutes on the latest A-10 Army Hunter-Killer Anti-Armor Tactics. I would like next to introduce Mr Wayne Coloney who will be the moderator of the panel. He will introduce the other members of the panel. Mr Coloney graduated from Georgia Tech with the very highest honors. He is one of the finest gentlemen I have ever had the opportunity to be associated with. He comes well prepared for this job. He was a Sergeant in World War II, participated as a Tank Commander with General Patton, and received several commendations for his very fine work. He is a professional engineer, and has founded his own company which works in structural, civil, legal, and energy engineering, as well as mechanical. He and his associate, Dr Charles Benedict, invented a gun loader for the A-10 and were very successful in that operation. In addition to his other activities, Mr Coloney is a strong American. He belongs to many of the American defense organizations. He is a member of the American Preparedness Defense Association and serves on the President's small business committee. I would like now to present Mr Coloney.

Mr Coloney: Thank you. Gentlemen, this morning I would first like to introduce members of the panel. Then, as we proceed, I am sure

that there will be questions from the audience. If you have a question, we would appreciate it very much if you would identify yourself so that we may prepare the minutes of the meeting properly, and also if you would indicate which member of the panel you wish to answer your question. With us this morning, on my extreme right is Major General Jasper A. Welch, who is Assistant Chief of Staff, Studies and Analyses, Headquarters, U. S. Air Force. Since each of you has a packet detailing all backgrounds and biographies of the panel, and since all of these gentlemen are very well known, I will not go into details. Just this side of General Welch is Captain Lon Ratley, A-10 SPO. Captain Ratley is the direct organizer, you might say, of this particular seminar, taking care of the details. You have just met General Hozzel. On my left is Professor Stolfi, who is presently with the Naval Postgraduate School in Monterey, California. Next to Dr Stolfi is Mr David George Opheim, who is Manager of Marketing Air Warfare, Honeywell. With us also is Brigadier General Robert Dale Russ, who is Assistant Deputy, Chief of Staff Operations for Control and Support, Headquarters, Tactical Air Command. Gentlemen, with that, and of course, with us also is General Bruce C. Clark, who is one of the experts on armored warfare--one of the leading exponents of armored warfare in World War II. General Clark is sitting in the audience but will participate as one of the panel. With that, we might as well begin. General Hozzel.

MORNING SESSION

General Hozzel: First of all, I would like to thank you, General Casey, very cordially, for the invitation to today's seminar and the friendly welcome in which you have introduced me to the audience. I am very honored to have to the opportunity to talk about my World War II experiences for the National War College. Late last year, the Battelle Institute of Columbus contacted me and asked me to summarize and write down my experiences. Meanwhile, this work has been done and was distributed to officers in your country. It may be that some of you have read it already. If not, at the close of the seminar copies will be provided to attendees. A few weeks ago General Casey contacted me and inquired as to whether I would be interested in presenting my manuscript to the seminar at the National War College. The end result is that I am before you today. I might add that I come to you with very warm feelings about your country, especially considering the position of the Federal Republic of Germany in 1945--totally defeated. I feel confident in saying that I speak for the majority of Germans as I express my heartfelt thanks for your assistance in building up the Federal Republic of Germany to its high position in the Alliance today. During the last two years of my service I was appointed Chief of Staff of Allied Air Power in Denmark at the very sensitive point of the NATO front. In this position, I had under my command American, English, Norwegian, Danish, and German officers. With deep satisfaction at that time, I felt that we as soldiers from different nations nevertheless speak one language and very quickly we understand each other.

Such is my feeling today, gentlemen. Facing you here is to be among men who have formed an international Atlantic Alliance that protects the free world against the worldwide threat by the Soviet Union. The United States of Europe will not be born in the near future. But one thing has, thank God, at least been done on the way to that desired union--the military integration in the frame of NATO without which Europe would have been lost long ago. And now I would like to give you an overview of my personal experiences in Stuka operations in World War II. After this, I will address questions from the audience. I may have some difficulties understanding your questions and expressing myself in your language. For this reason, it was necessary for me to engage the services of an interpreter in Germany for my manuscript who could express nuances in German as well as in English. For the seminar today, Captain Ratley has agreed to assist me as necessary with interpretations that may be required, as he is fluent in German, and I am told he is seemingly conversant in your language as well. Please bear with me if we encounter some language turbulence. I feel that it is important that you understand a few terms to which we will be referring throughout the course of the conference. In your information packets you will find a list entitled "World War II Luftwaffe Unit Strengths". The second sheet is called "Luftwaffe Unit Designations and Missions, 1939-1943 and 1943-1945".

Dr Stolfi: The first case that the General is going to talk about will be Poland, I assume, or perhaps some of his experiences just before the war. The Polish case I point out to you. Poland is not very modish or fashionable at the present moment for studying. It was supposed to have been a walkover by the Germans, and so on, but there are some interesting things that might be considered generally. The General, for example, had been a peacetime pilot for many years before the Polish campaign developed, and then, all of a sudden, there was a transition from being a pilot in training to going into the first campaign of the war. So there is probably some general merit in asking questions about Poland and what the initial impact was and the difference between training and actual combat for the Germans. The General had some particularly interesting experiences, because in directing Stuka operations out of East Prussia in the north, the timing of the opening of the campaign was pitched to aerial operations relative to the amount of daylight that was available, and so on, to begin the support operations. Let me give you just a quick example. The whole campaign in the West after the Polish campaign was contingent on the drop of gliders on the Belgian fortress of Eban-Emael. The entire German timetable was pitched to the gliders coming down when it was just dark enough to obscure the gliders coming in. Something like 2,200 German troops moved just as the gliders went in with just enough darkness so the Belgian defenders could not see them. There was a similar type of operation relative to operation in Poland where there was some very sensitive installation that had

to be taken out. This, to a significant degree, pitched the beginning of the campaign.

General Hozzel: Gentlemen, I intend to give you some examples of the sorties in the individual campaigns I was involved in. My first contact with the Stuka, the JU-87, began at the end of November 1938, when I was promoted to Stuka captain, to squadron captain*, as we say in Germany. This is the level of a company commandant of a company the first Staffel of I Stuka 1 in East Prussia. This group had been formed from the HS-123 group, which was a one-seater. It was the first aircraft in Germany which began to dive, but it was not the type we needed. The right type was the JU-87. Since a commander of that Stuka Gruppe had not yet been appointed, I was to take over the command for the present. Having taken over the Gruppe at its operational airport in Silesia, I ferried it, with all planes, across the "Polish Corridor", separating East Prussia from the rest of the Reich as a result of the Versailles Treaty. We touched down on Insterburg air base, the place where I had previously served as a reconnaissance pilot. Now the "cold homeland" had me again, a region I had come to like very much because of the charm of its scenery. Here a new task waited for us. We were to transform our Gruppe into a real Sturzkampfflieger Gruppe flying JU-87Bs. We were informed that the first Gruppe of JU-87 dive bombers would be ready to be picked

*US equivalent--squadron commander.

up from the district air base in the Reich. Having handed over our HS-123s, we received our brand-new Stukas which made a most martial impression on us. We first concerned ourselves with the details of instrumentation and with the hydraulic system, especially developed for dive bombing, finally with the bomb release. After a few short briefing flights the crews soon felt at ease in their closed cabins. We still had to learn how to control the JU-87 in nose-diving. There existed no Stuka school at that time, but there was the Barth air base in Pomerania where a Stuka training Gruppe was being built up within the Luftwaffe's training wing. The instructors first had to get familiar, in test flights, with the new weapon before they could pass on their experience and skill to the other Stuka Gruppe. We, therefore, helped ourselves as well as we could. We first singled out the crews. The pilot and his backseater, the latter also acting as gunner, had to be a real team; one that had to depend on each other, for better or for worse. Hence, each pilot chose his backseater. If after awhile it was found that the two did not harmonize, the men were replaced until pilots and their backseaters had found themselves. Some of the crews stuck--or crashed--together throughout the war. As for myself, I can say that my backseater and I have remained friends to this very day. After all our pilots had got used to the JU-87 and learned to have complete command of the plane in starting and landing operations, we practiced diving. In the vast forest regions around Insterburg a bombing ground with target cross and spotting tower was soon installed for us. We approached our target at an

altitude of 5000 meters, extended the hydraulic speed brakes shortly before the target, then making the target move into the bottom window in the cockpit below our feet. When it disappeared at the back edge, we turned the plane down at a dive angle of 70 degrees. With the gas shut off, the plane quickly gained speed by its own weight, whilst the diving brakes kept it at a steady pace of 450 kms/hr. We aimed through a reflector sight keeping the whole plane in the center of the target and allowing for velocity and direction of the wind, with the aid of the right lead angles. A continuously adjustable red marking arrow was mounted on the altimeter, set to local altitude above mean sea level, whereby the required bomb releasing altitude could be set. When passing that altitude in the dive, a loud and clear horn signal was sounded, warning the pilot to press the bomb releasing button on the control stick and to pull out the plane. By pressing the releasing button, we also automatically actuated the hydraulic recovery device which aided the pilot, under the heavy G-load encountered in steep dive recoveries, in pulling out of the dive. The normal bomb releasing altitude was close to 700 meters. Experienced pilots would also venture down to 500 meters in order to increase the bombing accuracy. This, however, was the absolute minimum pulling out radius to clear the ground in time. Below that there was no hope left as shown by the sadly remembered Stuka disaster of Neuhammer where a practically complete JU-87 Staffel crashed into the ground because of late recovery.

After we had obtained some mastery in diving the JU-87, we practiced dive bombing during dives; first with cement bombs, finally with live ammunition until we found our bombing accuracy was satisfactory. This meant that our bombs had to be within the 10-meter circle. A high bombing accuracy in diving was, in fact, the criterion of the Stuka weapon as compared to bomb dropping over wider areas from level bombing. The Stukas were, therefore, predestined for fighting pinpoint targets, preferably hangars, aircraft boxes, barracks, arms and ammunition factories in the enemy's back country; also bunker lines, artillery positions, tanks on the battlefield, and the like. Diving with and without bombs was part of our daily routine. Besides, we also began our unit training in Staffeln, as combat flying practice with the whole Gruppe. We drilled after the model of the Schleissheim Fighter Training School, going through the whole fighting program described before. This increased the maneuverability of our pilots. They had to become part of the plane. This included starts and landings on short, bumpy emergency airfields. Occasional crash landings could not be avoided. This preliminary training provided experience useful in anticipation of risky landings in unknown regions in the following war. That training phase was followed by combat fighting practice in squadron units and in given tactical situations as were to be encountered in wartime. This included directing the crews to the target, briefing them about weather conditions, the ground and the air situations, AA emplacements, replenishment of ammunition, fuse setting, the way of taking off--single or in formation--

starting order, unit leader, code designations, forming-up altitude, approach route, approach altitude, signal of attack, direction of departure, forming-up during return flights, altitude of return flight, landing order, subsequent discussion, preparation for new sorties. In this way we welded our Gruppe--now renamed I/Stukageschwader 1--into a unit always ready for action.

In between, I was assigned, in rotation with the two other Staffelkapitaenen, to the Stuka training Gruppe of Barth, in order to exchange our experiences with the Barth commander and his captains, and to evaluate them in practice. This was done by lessons, and by flying in tactical situations, with extensive air moves within the Staffel unit. All Stuka commanders and captains were thus steered through the Barth training lessons with a view to reducing to one common denominator the entire Stuka arm, increased to 11 Gruppen in the course of the year.

Audience: May I ask one question at this moment? The German dive bomber training was very complete and the General just pointed out that it was felt necessary to have dive bomber pilots actually also be fighter pilots, and go to the fighter schools. In addition, something that's hard for me to believe, and maybe the General will perhaps comment, that they actually practiced some dive bombing attacks which were 90 degrees. One mentioned that in his attack on the battleship Murat he did not come in at 70 degrees, he came way over, he actually practiced knocking out the battleship Murat.

General Hozzel: I will try to answer your questions, from your remarks. To go into a 70-degree dive it was necessary to press the plane nearly into a back position, into a negative, about 100 degrees, pulling it by and by into a 70-degree dive. But experienced pilots could dive with 90-degree dive bombing. This increased the velocity in the dive. Now about Stuka training from Barth.

In between, I was assigned, in rotation with the two other Staffelkapitaenen, to the Stuka training Gruppe of Barth, in order to exchange our experiences with the Barth commander and his captains and to evaluate them in practice. This was done by lessons, and by flying in tactical situations, with extensive air moves within the Staffel unit. All Stuka commanders and captains were thus steered through the Barth training lessons with a view to reducing to one common denominator the entire Stuka arm, increased to 11 Grupper in the course of the year.

In the summer of 1939 the political situation deteriorated. The tension with Poland kept on increasing. Dark clouds gathered at the horizon. In anticipation of an armed conflict with Poland, I/Stuka 1 was given an important order from general headquarters. We were to protect in combined action with an engineer unit of Oberst Medem, Elbing the Polish bridgehead of the large railroad bridge across the Vistula near Dirschau, against destruction by the Poles. To this end the five blasting installations at Dirschau railroad station--reconnoitered by our forces--and the firing wires

on the bridgehead were to be deactivated. Oberst Medem would at the same time advance with his engineers in an armored train from the Marienburg area in order to destroy the explosive charges. The combined action by Stukas and engineers was to be a surprise attack, giving the Poles no time to blow up the bridge. This was the reason why the attack was planned at three minutes before the beginning of the gneral Wehrmacht offensive, viz., on 1 September, at 0442 hours. The operation had to be most carefully prepared to be successful. We received detailed data of the targets and could thus pass on our orders to the crews. Everyone was fully acquainted with his target.

On 1 September 1939, at 0425 hours, I/Stuka 1 started from its jumping-off base, Elbingen, for its first sortie with 45 JU-87s. The approach to the Vistula bridge lasted just under 15 minutes. Weather conditions were unfavorable, with a visibility of 1 km only and a practically closed fog layer at 50-meter altitude. It was planned to destroy with two Ketten (six planes) in low-level flight the lead wires running along the railroad embankment to the bridge, then to blast the detonators in Dirschau railroad station by the mass of the Gruppe, in a dive bombing attack. Much depended on how the weather would develop at the target point within the next 15 minutes. The latest weather report given out by a German observation post on the west bank of the river told us that the target was almost completely covered with a fog layer which had a slight tendency of breaking up. It was therefore

doubtful whether we could, after all, make the planned high-altitude attack. Time pressed. We decided to climb through the fog layer so as to be able to form up the Gruppe which, in view of the small range of vision, we could not have done below the clouds. Above the clouds there was sunshine, below us we saw a widespread layer of fluffy clouds extending toward the target area. Through small loopholes in the clouds we could see the ground. Considering this situation we had no choice but to push down again through the openings in the clouds, in successive flight formations, for a low-level attack by the whole Gruppe. This would, of course, reduce our bombing accuracy considerably. The mere thought of it did not make me feel too easy. When forcing down we unfortunately suffered the first loss of one of our crews by a crash fire. The plane, having pierced the clouds in blind flying, had struck a hill. We were just passing that place again when we saw the six planes having started immediately behind us and which had been ordered to fly the low-level attack against the railroad embankment, disappearing in the haze. Visibility had slightly improved. The Ketten could join up behind me. When we flew across the Nogat River near Marienburg, still in low-level flight, the weather changed miraculously. It cleared up, we gained in altitude and caught sight of the bridge. Below me, on the double-track railroad line Marienburg-Dirschau, I caught sight of an armored train and a freight train, both steaming along in parallel, at high speed in the direction of the bridge. It was Oberst Medem with his engineers. Having meanwhile climbed to an altitude of 2000 meters, we approached our

target from east to west, exactly above the Vistula bridge. Below us, half left, our brave Oberleutnant Dilley, Staffelkapitane of the 3rd Staffel, swung on with his two Ketten from the south, then hedgehopped in the direction of the railroad embankment. While nosediving we saw him rushing through below us. We observed his six exploding 500-kg bombs tearing up the railroad embankment on the Polish bridgehead. Then--while pulling up-- we watched the rising mushroom-shaped explosions from our own bombs which had apparently hit their targets. The bridge had remained intact. I dismissed my Staffeln to a new operational airfield in the south of East Prussia. I myself stayed near the target in order to observe further developments on the ground. Much to my consternation I noticed that Oberst Medem's trains had not succeeded in advancing to the bridge. The surprise attack had failed. Obviously the Poles had smelled a rat. They had, after the last train had passed the bridge during the night, barricaded the access to their bridgehead, brought antitank guns into position behind it and had waited there in ambush. When the engineers in their two trains steamed toward the bridge at high speed the Poles fired at the locomotives, setting them afire. Thus they brought the attack to a halt. Later on we learned that a combat ensued which lasted for hours. This gave the enemy time to patch up the destroyed blasting installation and firing wires. Then, roughly four hours after our air attack, the Poles succeeded in blowing up the bridge after all. Our well-planned operation had been in vain. But how did the Poles know of our intentions? It resulted from subsequent interrogations

they had no definite information but had simply suspected an attack. A ridiculous omission on the German side was responsible for the failure of the operation. It had been customary with the German and Polish railroad personnel on duty to wish each other "good night" after the last scheduled train had passed, via the railroad telephones installed at both sides of the river. They had known one another for years. In the night from 31 August to 1 September there was no such call from the German side. When the Polish personnel tried to ring up their German colleagues, the line was "dead". The Germans had switched it off. In view of the extremely tense situation this was a danger signal, and the Poles acted accordingly.

I brought this up intentionally because you should see that the devil is in the detail. Who could think that such would happen, and so the whole thing was in vain. After Dirschau had been taken and the bombing efforts had been investigated, I/Stuka 1 was given the satisfaction that the attack was successful, and that the failure of the operation was due to unforeseen circumstances.

Moderator: Are there any questions from any of the other panelists? General Russ, Mr Opheim, General Welch?

Reply: Not at this time.

General Hozzel: Now I will present you with a sortie of my group against a fortification line which prevented the first German call to break through and take the city of Mlawa in North Poland. Two

days later, 2 September, I was called up by the Chief of Staff, Territorial Air Command, East Prussia, Oberst Holle, my former Anklam Commander who declared to me that the attack of the I Army Corps against Mlawka had been held up by the bunker lines in front of the town. I was to take up contact in the evening of the same day with the Chief of Staff of the Army Corps to discuss with him the question of close air support by my Gruppe. On reporting there I was received rather ungraciously. The Chief was obviously irritated by my subaltern rank, setting little hopes in discussions with an Oberleutnant of the Luftwaffe. I was shown an aerial photograph of the fortifications in which I could recognize a long line of smaller and larger bunkers. I stated that we, as Stuka fighters, were specialized in such pinpoint targets and that I thought we could clear the way for Corps I, by three attacks with 40 planes each, each plane loaded with a 500-kg bomb. The faces of the Commanding General and of his Chief brightened. We then fixed the time of the attack in three different operations. At the same time I entreated both officers not to start their own attack before the sorties were completed, to prevent us from dropping bombs on our own troops. Having rushed back to the air base about midnight, I reviewed the action planned against the bunkers with my comrades. Early in the morning of 3 September the weather was clear. Forty minutes after our take-off for the first attack we found ourselves above the target at an altitude of 4000 meters. We nosedived, then released the bombs at altitudes between 700 and 500 meters for better bombing accuracy. We were over level

country without any ground obstructions. This enabled us to descend to such a low altitude. As far as I could observe, we scored a number of close hits. Then we returned, refueled, bombed up, and started for the second attack. The same results. Ready for the third attack. I was about to take off when the starting sentry, with a telephone receiver in one hand, raised the red flag. At the other end was the Chief of Corps. "Do not start. Troops about to attack. Great success. We thank you." Well then. As we later learned, we had made some direct hits. Even our close hits, having shaken the bunkers, had put the gunners out of action. This was to show you it is possible with such a Stuka group to make a Corps, which was prevented to break through, to break through a bunker line. Have you any questions?

Dr. Stolfi: This Mlawa operation just to the south of East Prussia was particularly interesting. The Germans got themselves very badly bogged down in front of the Mlawa fortifications. There was some kind of a loss of nerve and loss of some kind of aggressive development among the ground forces. Generically what happened, and that is why this operation is particularly important, is that the Stukas, and it was mentioned that there were 120 planes in this flight, were literally the weapons that were responsible for the breakthrough of the Mlawa fortification. This is a rare generalization. In almost every place in the campaign in the Second World War the ground forces got a lot of support from air, but it is a very rare case when you can really credit air for

being responsible for decisive action on the ground--really completely responsible. And the Mlawa operation I think is one of the few cases where after the ground forces had failed, the Stukas came in for a short but very intense bombing, 120 of these aircraft coming in, in a short period of time. These aircraft were literally responsible for the breakthrough at that point. This generalization is hard to make. You can support your local air force as much as you want, but it is very hard to say that the air force is going to be decisive, especially in pretty tough ground action. But I think the generalization--and what is important about this is that the air force, the Luftwaffe, in that short series of operations actually opened up the Mlawa fortifications. When General Hozzel said, for example, that he got the congratulations from the Corps, I do not think he said it quite strong enough. The Corps was saying, "You allowed us to break through; you were responsible for that breakthrough". You cannot find very many cases like that. But that is at least one if somebody is looking for certain types of ammunition relative to air forces and what they can buy for you.

Moderator: Are there any more comments from the panel?

General Welch: In this particular case I guess it is surprising if the army is bogged down and they knew where the fortifications were. They presumably had some artillery support, and I was curious as to what was the technical factor which made it appropriate or necessary for the dive bombers to do to the fortifications what presumably the artillery tried and could not do.

General Hozzel: I cannot answer this. I do not know. We were called to help the first Corps, obviously, because they actually could not do the work, otherwise they would not have called the Luftwaffe.

General Welch: Three or four possibilities come to mind. For some reason, the artillery was thin. Second, I gather, unless they had some difficulty, that your accuracy and their accuracy was about the same in that period of time, as I remember. But of course the fortifications could have been of such a character that the larger explosions were critical.

General Hozzel: This could be. I must honestly confess I have never had in mind why the artillery of the Corps could not do the work. At that time, I had no idea to ask the Commanding General or the Chief of Staff.

General Welch: It was not your place.

Question: You mentioned accuracy many times. Could you give some idea of the accuracy of the Stuka with bombs?

General Hozzel: The accuracy depended on the training of which I have spoken before. We had the goal at the time of training to drop our bombs within a 10-meter circle around the target's middle point. I must honestly confess that this was not achieved every time in the course of the war. It is another thing, dropping bombs in a training time without fear of being shot, or doing this in war.

It depends on the individual pilot and how his nerves were. Was he strong enough to keep the target in sight up to the last second before dropping the bomb. It is natural in humans that some pilots-- I couldn't observe everybody--dropped the bomb too high, and their accuracy was not as high as it was expected to be.

Moderator: In response to the question on an overall basis, could you give some estimate as to how accurate your efforts actually were?

General Hozzel: As I told you, we had some direct hits on some bunkers, and some near hits. Today, it is impossible to say what percent of the bombs we dropped did this.

Audience: In setting up the pass, he would dive in, actually go beyond 90 degrees sometimes when the aircraft would go back, but that is only in establishing the dive angles. Then he would pull it back up.

Moderator: Excuse me, Captain, for the record the question was whether or not they were actually making an attack pass at a negative angle. As I understand the response, that was simply a transitional phase. Are there any other questions? Mr Opheim?

Mr Opheim: Were delivery tactics exclusively dive or did you in some cases, due to weather, use lay-down or flat-delivery tactics at low altitude?

General Hozzel: No horizontal or level attacks ever. Slant angle, yes.

Mr Opheim: What was your typical slant angle?

General Hozzel: An angle of 30 to 40 degrees.

Mr Opheim: With what accuracies could you deliver the bomb?

General Hozzel: I will refer to this topic later on. But I can tell you now, it depends on how near the pilot approached the target in dropping the bomb--for example, into the belly of the tank. If we would have achieved a near hit, it could tear the tracks from the wheels, you see. This could happen and it happened several times.

Moderator: Dr Terry had a question. The question was at the extreme dive angles, the point was made that the aircraft would sometimes go over negatively 110. In some cases, however, to clarify this point, the actual dives were at 90 degrees for the attack--that much. How much the aircraft would go over for the person to maneuver it to 90 I am not certain. We do know that when Rudel hit the Murat he came down at a 90-degree dive. The question is, at a 90-degree dive, how does the bomb clear the screw? There was a fork that lifted it out. That was handled technically. So that the bomb did not go straight out, it moved forward on this fork but underneath the screw.

General Hozzel: The normal dive was 70 degrees--normal dive. But it was necessary to pull the aircraft into a 90-degree dive first in order to then put it in the 70-degree position.

Question: I gather that you were not in radio communication with the front line. If not, did you have any other signals, smoke or some panels, or any communication other than when you got back to your own airfield?

General Hozzel: Not in the first phase of the war. We had no communication with ground troops. But if we wanted, they could give signals, by flares or by other means. I will refer to this topic later on.

Don Haskell, Army Ballistic Research Lab: General, would you be able to describe the type of bunker and the type of fusing--super quick or delay?

General Hozzel: Attacking a bunker line, we needed delay fuses, a quarter of a second delay.

Question: Did I understand General that you said you were dropping 2,200-pound bombs?

General Hozzel: 500 kg.

Moderator: 1100 pound--that explains part of the superior effect over artillery--1,000-pound bomb coming down, delayed fuses, maybe even armor heads.

General Hozzel: This may be.

General Russ: Did you have any problem with fragmentation damage from the bombs? Starting at 700 meters, pulling out, I am sure

that there had to be quite a few G's that had to be pulled on the aircraft, and at those steep dive angles, it seems that you would have a fragmentation problem.

General Hozzel: We could clear at treetop level. Not in this case. When we attacked their tanks we had to approach the target very near, and drop the bomb in the 30 to 40-degree angle into the belly of the tank, and to have a direct hit it was necessary to fly over the tanks at a few meters' height and then it happened that we were in danger of our own bomb exploding. This happened, but not in those sorties which I described just now.

Moderator: Are there any other questions from the audience, or any further comments from the panel? If not, General, would you like to proceed.

General Hozzel: After Poland, there was some time of interludes. I will report about changing our series of JU-87s. This happened in about March 1940. I was called to the air base of Goettingen. After we had landed, I reported to the commander of the Regional Aircraft Park, a logistic unit where all technical equipment, from the spanner to the complete plane is sorted, maintained, and held available for delivery. The commander handed me an order of the Luftwaffe High Command, informing me that I/Stuka 1 was to exchange all of its JU-87s at the Park for a new series of the same plane type, then transfer these to Delmenhorst-Bremen air base. When the hangar doors were opened we saw, greatly amazed, 50 brand new

JU-87s lined up for us. They differed from our old planes in that they were equipped with an additional fuel tank below the wings. The tanks, having about the size of a 1,000-kg bomb, had a capacity of 300 liters each. This meant an increase of the operating radius by 100 percent, with a flying time of roughly six hours. What were they going to do with us? Where would be bound for?

What came up was the campaign in Norway. I will report about this campaign and given two examples of sorties in which we were involved. I will report about an attack against a British bridgehead at Namsos. This is north of Trondheim. We were coming up from Oslo having helped a German infantry division. Taking up a northern direction to Trondheim, we were called up to Trondheim air base. Hardly had we landed at Trondheim when the first operational order was issued, one hour after our landing.

The British had gained a footing in Namsos, north of Trondheim. They were supplied by transport ships passing through the deep cut along Namsos Fjord with Namsos port located at its end. There the transports were discharged under the guard of warships. The I/Stuka 1 was then the only available operational unit to be put into action against the British base and its supply vessels. The following day we fully concentrated on those targets. With the exception of the first Staffel, the mass of our pilots were not experienced in dive bombing attacks against moving marine targets. During our first sorties many a bomb missed its target but soon we learned it. We finally succeeded in sinking several

transports on the high sea and inside the Fjord. We then attacked the small cruiser which had annoyed us all the time with its fire. We flew a number of feint attacks until the cruiser had apparently used up most of its ammunition. Then we attacked with the whole Gruppe, sinking it by two direct hits. As we learned later, it was the 4,500-ton torpedo cruiser "Mogador".

On the morning of 3 May we made an astounding discovery. The British, having left Namsos at night, were said to be on the high sea, returning to England under strong protection of escort vessels. The idea suggested itself to pursue and attack them. A contact plane was close to the enemy, a pilot plane guided us to the target area in the same way as on our recent operation started from the Holtenau base. As a naval patrol plane had reported, the formation consisted of one battleship, one cruiser, several destroyers, and a number of transports, one of them 14,000 or 15,000 tons. The convoy was, by now, about 300 kms away from the Norwegian coast. It would thus take two more hours before we could attack it. We were given quite a tall order, considering that we had to fly in single-engine land planes without radio navigation aids over a total distance of 700 kms across the open sea. In case of engine failure, the crew could hardly be expected to survive. We had, true enough, a rubber boat on board but would hardly be able to make use of it as, with our fixed landing gear, our plane on touching down would inevitably nose-over and sink with the crew at once.

Flying at an altitude of 4,000 meters we spotted the convoy after 90 minutes and found it as described by the observer plane. Both planes were manned with four experienced naval officers who could now witness the exciting battle--to begin instantly--away from the AA fire as if they were seated in a theater. I myself picked out the most lucrative targets, the battleship, the cruiser, and the largest transport. By radiophone I allotted the remaining targets to the three Staffeln, diving myself on the battleship with the Stabskette (staff flight) and the 1st Staffel. Even before we were directly above the naval formation we met with the fire from all barrels, as we had never experienced before. While we dived through a dense barrage of fire furiously spitting against us from below, we aimed and released the 500-kg bombs at an altitude of 500 ms, with their armor-piercing heads. Every pilot was guided by the hits scored by the plane in front of him and had to adjust his point of aim accordingly. The first six bombs failed their target; the seventh hit the forecastle of the second front turret. When I was about to pull up, having just reached an altitude of 1,000 meters, a vehement explosion blast threw my plane up so strongly that my head was flung against the cabin roof. For a moment I felt stunned. When looking down again, I saw the battleship had disappeared under a dense cloud of smoke. The cruiser and the transport vessel were sinking. All this happened within a few minutes. It was high time for us to break off. We had lost sight of our two HE-111 planes. In the haze of the battlefield they had lost sight contact with us. We flew

alone again. I joined the group for our return flight in an eastern direction. All we had lost were two crews. However bitter the loss of each single comrade was to us every time, we had survived the fireworks fairly well, not to speak of our success. We flew at low level above the waves in the direction of the Norwegian coast. Somehow, a happy feeling came up between the crews. Pressing the button of the radiophone I heard my men singing. They sang the song of the Navy because all of us felt so close to the sea now. "Wir sind Kameraden auf See" (We are comrades at sea). Thus the tension of this strenuous operation relaxed. I still had to guide all of them safely back to our home base. I did not know how far we had been displaced to the north or to the south by the wind. By comparing the map with the coastline, I hoped I could make out whether Trondheim was north or south of the point where we would reach the coast. I was lucky. We sighted land north of Namsos, turned south, then landed safely on our planked runway in Vaernaes. We were received there with great rejoicing about our success which had hurried ahead of us by the radio report of reconnaissance aircraft. This, however, did not restrain the Chief Pilot from launching us for a second sortie against the convoy. The "Wooden Cross" of the Iron Cross" was his device when he dismissed us for the new combat mission. We, however, never saw our target again. The enemy had eluded us after so many hours had elapsed after our attack. I had to break off our second mission as I had to guide my Gruppe safely back before nightfall. The following day all pilots and gunners of I/Stuka 1 were solemnly awarded the Iron Cross First Class for their engagement.

Moderator: Are there any questions or comments from the panel?

General Hozzel: May I add a short sentence. It was later on contested by the Navy Supreme Command that we had sunk a warship. They said it was only a small cruiser. No comment. The British never gave any comments to this attack.

Dr Stolfi: I think that there is a moderately interesting comment to be made. The amphibious operation have obviously been tremendously important for the West and particularly the U. S. during the Second World War. They were the monumental operations characterized by Western, not German, Allied operations. When you take the Africa landings, Sicily landings, Salerno, Anzio, Normandy, and the business in the Pacific, we have immense experience in the U. S., Britain, and so on, in supporting amphibious operations. What I think is unique about what General Hozzel is talking about is that the British and the French made an amphibious landing at Namsos and the Germans were in fact attacking an amphibious force coming in. None of us have had the experience, or very little experience just at the beginning of the Pacific war, and that went very fast, of actually the problems of resisting an amphibious force coming in. This--what is particularly intriguing about that too is it's a shame that Major Kelly is not here today. The Marine Corps may possibly somehow or the other become a partial strategical reserve for NATO. Certainly one of the more intriguing things would be the possibility of landings in Norway. The kind of interesting thing in General Hozzel's experience and the German

experience is resisting the British and the French amphibious force, for example, which was attempted during the Norwegian invasion by the Germans to support the Norwegians. So there is a kind of unique thing there. We do not have anybody who has the experience of resisting, for example, an amphibious invasion. We do not think that way. When we think of aerial operations, we think of supporting amphibious operations and going in someplace, and it is very interesting looking at, or potentially looking at, the problems of resisting an amphibious operation which the Germans were doing in this operation.

General Hozzel: After this Norwegian campaign of which I have reported two sorties, I will switch over to the last phase of the campaign in France. From Norway we transferred from one day to another to Evreux about 120 kms west northwest of Paris. On arriving above the area said to be our "landing grounds" all we could see below us was a grain field in the midst of hedgerows and shrubs. We could not discover any landing strip. On looking more closely, we recognized some excellently camouflaged planes under the shrubs, a number of JU-87s. We had reached our destination. Now a landing cross was placed on the grain blades as an invitation to land. This was new to us. We never had landed on a grain field before but managed it quite well. The braking effect of the blades made us roll to a stop more quickly. On the other hand, we needed more time for the take-off. We were put under the command of General von Richthofen of the Eighth

Air Corps. I had not met him personally before but was to meet him soon. While we refueled, the order was given for the attack against the mole forts of the naval port of Cherbourg. The forts, with their heavy zone fire, guarded the city against the German troops at its western periphery. Having loaded our 500-kg bombs fitted with armor-piercing heads, we took off. As we had received aerial photos of our target, I could allot the targets before our start. Near Caen we took course for the Seine Bay, flying at an altitude of 4,000 meters, then while sighting the coast we headed for the port of Cherbourg. Halfway to our target we noticed a large warship moving parallel to the coast, obviously ready to intervene in ground fighting with sweeping fire. We regarded it as an enemy ship because we had not been notified of the presence of German units in that Channel area. The Staffelkapitaene called me by radiophone. "A warship, isn't it? Quite a fine catch. Wouldn't it be better to crack that one than those forts?" It was a most tempting thought. The "steamer" down there kept quiet--did not fire. It was like a challenge, but I was bound by my orders. I followed my intuition and continued on my course to Cherbourg. I could well imagine that many an officer flying behind me must have shaken his head. Our operation was a great success. After a classical dive bombing attack on the forts, the enemy fire was silent; Cherbourg was stormed and captured. When, later on, I reported to the Chief of the Corps my moral dilemma about the battleship, his laconic answer was, "You surely would have had to face a court-martial". This operation was followed by a few more close-air supports, then France capitulated.

Moderator: Are there any questions or comments from the panel?

Mr Opheim: You described your bombs as having armor-piercing warheads. Could you describe those more in detail in terms of type of warhead and the fusing?

General Hozzel: I must honestly confess I cannot Mr Opheim. The only thing I remember is that the attack was with armor-piercing bombs. We had them, but what the technical details were, I cannot answer.

Moderator: Any other comments? Anything from the audience?

General Hozzel: About being involved in the air battle of England?

Audience: Before the air battle of England, I would like to hear your impressions of the British withdrawal. Was this what you were talking about?

Moderator: This is Colonel Dilger. His question is to General Hozzel asking for his impressions of the British withdrawal from France.

General Hozzel: I was not involved with this phase of the war in France, but I heard of it. I cannot say anything other than I have read about this. You know, Colonel, that the English 300,000 man corps had their back to the sea at that time. It is a miracle that they could escape. Up to now nobody has understood it. I remember that Reichsmarshal Goering at the time had promised that he could destroy the bridgehead of the English alone with the

Air Force, without involving the Army in this operation. It did not work because of the weather situation as you perhaps know. The English could escape because there was a period of three days of bad weather. So I think that the calculation of the real situation was mistaken. It was an error of the Supreme Command of the Luftwaffe. The Army could not proceed. It was forbidden by the Supreme Commander of the German Wehrmacht. This was Hitler. There was another idea I may report. Hitler had a special feeling toward the United Kingdom, to the British empire. He loved it. Maybe it was in gesture to Chruchill, "Here you have your 300,000 men. Make freedom and peace." This is an idea; it has never been proved, although possible. This may explain why we attacked Poland after we had taken Czechoslovakia. Hitler did not imagine that England at any time would enter the war between Germany and Poland and make a broad war out of this. He had not believed it. Otherwise he would never have done it.

Dr Stolfi: I think that General Hozzel has just talked about, you might say, generic attacks with aircraft against what would have to be called major fortifications. I sense that there were special difficulties throughout the Second World War and those same difficulties would occur today relative to heavy fortifications. Normal mobile field artillery, let us say, going up to 155-millimeter guns or howitzers or even bigger, 208-millimeter or 8-inch guns, are not much against certain types of fortifications including a lot of concrete and steel. There was a tendency during the war for the Germans, when they were pressed and had to operate against heavy

fortifications, including heavy field fortifications, to go to the aircraft which had the big bang, relatively big bombs which they could get on them. So at the fortresses like Cherbourg, Tobruk, and then maybe a classical case in the Second World War, Sevastopol, the aircraft were called upon because of the relatively large fortifications. For example, at Sevastopol the Germans felt it was so important that they used large Stuka formations. Manstein had specially assigned to him for the fortress. But in addition, they found it necessary to bring a gun called "Dora" which had a 36-inch bore. This was brought on a double rail line all the way from Germany. The gun mounted on the rail line--this is going to be mind boggling--weighed 2,600 tons of 36-inch cannon. It fired an armor-piercing projectile which was 12 feet high and weighed 6 tons with a muzzle velocity of 2,000 feet per second. That special kind of ordnance the Germans brought all the way from Germany to reduce the Sevastopol fortifications. The only other thing that would have made a dent in the fortification would have been Stuka, maybe even with a bigger bomb than 500 kg, perhaps a special 1,000-kg bomb. But it is the kind of generic factor that you get here and that is that aircraft against big fortifications are one of the few things that are really useful.

Moderator: Thank you Dr Stolfi. I believe there were some questions from the audience.

Question: My name is David Keener and I am from the CIA. I have two questions that are related. First of all, was the Stuka aircraft

used only for preplanned attacks on point targets, and secondly, was there at this time any technical means of communication between the Stuka pilots, or at least the commander of the Kette, and the ground forces?

General Hozzel: To answer the first, we had preplanned targets as for example, to attack the forts. This was a preplanned target, or to attack the Mlawa bunker line was a preplanned target. But, in the battles of the Eastern front, we as a Geschwader, if we had no preplanned targets were fully free to attack in the field whenever we saw a target. This was only at the Eastern front; I have never experienced this at the Northern front. It was all preplanned, as had been at the Mediterranean or in North Africa, in Greece, Yugoslavia--these were preplanned targets. Only in the Soviet Union were we free if we had no preplanned targets. This was, so to say, a fighter bomber controlled sortie. "Hurry up, targets, attack, and report." We had a very poor communication set in our plane. It was able to contact us to connect us over a range of about 80 km with a ground station. We could reach the guard station within 80 km, and he could hear us and we could hear them, but more than this was for us not possible. If we were 100 km away, no contact; but the ground station could reach us up to 200 km, however, they never knew whether the message had reached us. So we had no navigation possibility in bad weather situations. The only thing we could do was to fly through a bank of clouds about 1,000 or 2,000 meters.

Question: I was specifically interested in knowing whether you had the technical means of communication with the lead elements of the ground control.

General Hozzel: Yes, I will refer to this during my presentation on the Eastern front.

Moderator: Are there any other questions?

General Hozzel: I will give a short presentation about our being involved in the air battle of England.

The first strategic operation in the history of aerial warfare, the Battle of England, began with the keyword "Eagle's Day 13 August". I/Stuka 1, jointly with II/Stuka 2, was put into combat action against the British fighter base of Filton, about 80 kms north of Warmwell. On the assumption that our attack would come as a complete surprise, we were to hit the "Hurricanes" and "Spitfires" in their boxes before they were given a chance to take off. We, as pinpoint dive bombing specialists, were ready for our targets, but we had not reckoned with what our "host" had in store for us, as will soon be seen. That morning we had taken off, with about 80 JU-87s in Angers, landing in Dinard for our jump off to the coast. Assigned to us as fighter escort for the planned Stuka attack was a Jagdgeschwader (Fighter Wing) 53 under the command of its young Commodore, my successful training comrade, Major Baron von Maltzahn, and a Geschwader (Wing) consisting of twin-engined heavy ME-110 fighters. The participation

of the latter in that action was, unfortunately, only of symbolic value because the ME-110s were too clumsy and no match for the British fighter aircraft. Our heavy fighters needed their own fighter escort.

We took off; picked up our fighter escort over Guernsey. Then, climbing to an altitude of 4,000 meters, we headed for the enemy. The escort planes were buzzing around us--a comforting feeling. Above the channel the weather was quite clear, but when reaching the English coast we met with a closed layer of clouds which extended over the country as far as we could see, at an altitude of about 3,000 meters. We could not guess the altitude of the cloud cover above the ground, hence, it was impossible to approach our target in clear sight of it. We had no alternative but to continue on our course for another 15 minutes, then to dive blind through the clouds hoping that we would emerge above the target with sufficient freedom of motion. It was a most doubtful assumption, as we should soon realize. All of a sudden our British "comrades" shot up like torpedoes through the clouds, each plane vehemently firing from its eight barrels at our unit now flying in wide open formation. With the 250-kg bomb, visibly suspended from our fuselage, each of our Stuka bomber crews sat, in the literal sense of the word, on a powder keg. Now the first explosions were heard--a sudden fireball--and all was over. Our fighter and destroyer planes dived on the enemy and so tied down a great number of attackers, but many of them were still left to us. We,

with our weaker guns and burdened as we were with our bomb loads, were unable to ward them off. We had no choice but to dive down and drop our bombs on the coastal port installations, then to return in a hedgehopping flight across the channel to our home base. Thus we escaped further attacks, if only from below. With difficulty, I was able to assemble my Gruppe, thus increasing our firepower in defense of the British fighters pursuing us. Many a Stuka fell victim to the pursuers in single flight above the Channel. Having landed again in Dinard, we found that both Gruppen had lost about one-third of their planes. The rest of us were pretty heavily damaged by enemy fire. We soon learned that other Stuka Gruppen had met with the same fate that day. The German Command had profoundly erred in judging the strength of the British fighter forces which, at that time, were twice as strong as had been assumed. Our Stuka Gruppen were, all the same, thrown into battle again, twice or even three times, with the result that they suffered further unbearable losses.

In the end, reason got the upper hand with the Supreme Command of the Luftwaffe. It was realized that in view of the heavy losses any further Stuka actions against the British Island could not be justified. We were consequently "withdrawn from service" for the time being, so as to allow our heavily decimated forces to rehabilitate in preparation for new operations.

Moderator: Does anyone in the audience or on the panel have any comments or questions?

Dr Stolfi: I think a comment might be interesting. With the Stukas against Britain the situation was that the Germans were not able to achieve air superiority with the fighters and the apparent lesson is that when you do not have that air superiority, what has come out erroneously, is that the Stukas at this time were chalked off. I think many of you in the audience assume that roughly after the Battle of Britain, and during most of the Second World War, the Stuka was an obsolete aircraft and ceased to exist. I think here the historical lesson is a very sensitive and esoteric thing. I think that what happened was that when you do not have air superiority, especially with high-quality fighters like the British had, these types of attack operations were exceedingly difficult. I think, still, that it was possible for the Germans with the appropriate tactics to have used the Stuka somehow or other. What has happened historically is the Stuka was chalked off after this, and this is an erroneous interpretation of the war. The Stuka went on later in the war to be the big killer of ships in the Mediterranean and probably the most effective killer of ships in the Second World War as a specific weapon system. On the Eastern front, the Stuka went on after this disastrous experience, which I think was generically an air superiority experience but not anything necessarily to do with dive bombing Stukas. On the Eastern front, the Stuka held its own very comfortably for the rest of the war. The Stuka was particularly impressive in the Mediterranean against British ships after the English campaign.

Colonel Dilger: Along that line, General Hozzel, what were the losses in a relative sense of other type aircraft like the ME-109 or whatever else went over to Britain?

General Hozzel: Not as much as we had, but they had severe losses as well. It was necessary to end that air battle over England. The losses were not as severe with the other bomber units or the fighters.

Dr Stolfi: I think a comment may be in order. The Stukas in the first several attacks were hurt very badly. Now when you look statistically and you spread this thing out in time, I think what the General is saying is that the Stuka losses were more severe than the HE-111 losses. When you spread this thing out in time, Stuka attacks were stopped but the HE-111 attacks went on for a couple more months. When you look at the relative losses that the HE-111 developed over a considerably longer period of time they lost probably as much; possibly even more. So there is a question of time on this thing. There were no single attacks I think in which the HE-111 suffered quite that much, but ultimately they lost just about as many aircraft too. Eventually, they had to be pulled off the operation also, only it took them a couple of months.

General Hozzel: Now, a short interval. We were sent to Stuttgart-Echterdingen. We received a new series of JU-87s, long-range possibilities, 6-1/2 hours flight range, and they were painted brown and this meant we were bound for new coasts in the south.

I will now report about aerial warfare in the Mediterranean and North Africa.

Early in 1941 Stukageschwader 3 landed with about 80 planes of I/Stuka 1 and II/Stuka 2 at Trapani on Sicily where all were placed under the command of the Xth Air Corps; Catania known to us from Norway.

On or about 10 January the Geschwader received news that the British aircraft carrier "Illustrious" was bound from Gibraltar for Malta. It was expected to pass in the next few hours the offshore island of Pantellaria, south of Trapani. It was said to cruise quite unsuspectingly and as if the British ruled the Mediterranean, proudly ignoring the existence of any Italian Fleet or Air Force, not to mention the German Stukas on Sicily. It seemed to be a fine catch for us. It was decided to attack the carrier, taking it by surprise. Our two Gruppen prepared for action, loading the 500-kg bombs with armor-piercing heads. Soon we were given the operation order. My friend, the valiant commander of II/Stuka 2, Major Enneccerus (Brigadier General after the war), flew the first attack while I was on another mission. On his return he reported the carrier had received four direct hits and was left lying off Pantellaria with a slight list, apparently in a disabled condition. Evidently the Stuka attack had come as a complete surprise as only two fighter planes had been seen in the air, and the AA fire had set in too late. The carrier must have felt very safe. Later on we learned that American reporters, then on board, gave an account of their surely most exciting experience. Before

the Geschwader could prepare for a second sortie with a view to sinking the carrier, bad weather set in, lasting for two days. Thereafter our aerial reconnaissance could not spot the carrier for awhile, but finally located it, well camouflaged, at the quai of La Valetta. The British, taking advantage of the spell of bad weather, had towed their disabled carrier into the naval base of Malta, a port protected heavily by AA batteries and fighter aircraft. A brave feat.

Now this aircraft carrier was for the Supreme Command of the Luftwaffe a matter of prestige, also a precedent. It had to be sunk under all circumstances. If the Supreme Command of the Wehrmacht could have reported the sinking of an aircraft carrier by German Stukas, both friend and foe would have sat up and taken notice. So commenced our attacks, with heavy losses, against the aircraft carrier in La Valetta. In La Valetta more than 90 AA batteries of all calibers spit their fire against us, the attackers. At the same time a strong unit of "Hurricanes" seriously interfered with us on the approach route and after our departure. In practically every sortie I lost three or four of my old-battle-tested crews--an irreparable loss. It was just impossible to replace those thoroughly trained and experienced pilots and their backseaters. During those actions the carrier was hit by four 1,000-kg bombs, the heaviest a JU-87 could carry. Still we did not succeed in sinking it, though she must have suffered terrible inner damage. Another spell of bad weather set in and provided a short "breather" for us--time to lick our wounds. When our air reconnaissance

reappeared over La Valetta to locate the carrier, the vessel had disappeared. In league with the weather, the British had been able to tow the "Illustrious" through the Suez Canal. Later on it was reported that the heavily damaged ship, having been repaired in American dockyards, was put into service again in 1943.

Early in February we were ordered to transfer to Tripoli, North Africa. The Italian Army had been defeated, a motorized British advance force had already reached El Agheila south of Bengazi, on the Great Syrthe Bay. General Rommel was being expected in Tripoli where he would set up a new army from German and Italian units; an army which was to dislodge the enemy again from Libya and Cyrenaica.

We then transferred to Bir Dufan in the desert, a small hunting seat said to belong to Italian Air Marshal Balbo. It was situated about 100 km south of Misurata, on the camel rider track leading to Dakar on Africa's west coast. There we pitched our camp. It was a romantic, adventurous atmosphere. We thought back to the dreams of our childhood.

One morning General Rommel landed in our camp in a Fieseler "Storch" plane, to find out in which way we could support him while he gathered his army in the Tripoli region. He told us that it would take him six weeks at least before he could move into battle. Until then we were to get the British off his back. In Berlin he had been assured that the two Gruppen of our Stukageschwader 3

would master that task. For us this was, of course, a grave commitment. Before leaving us Rommel said that he wanted us to act quickly, to stop the further advance of the British. To us this meant an attack against the armored spearhead in El Agheila.

Our I/Stuka 1 had the honor to fly the first sortie in North Africa. A sandstorm came up. The Commodore did not insist on our take-off. On the other hand, Rommel's situation was most precarious. I consulted with my captains. We decided to risk the instrument flight. The motors were fitted with dust filters. All of us were trained in blind flying. The Ketten took off at intervals of one minute. Only after we had climbed to an altitude of 2,000 meters was our visibility clear. Forming up, we started on our 500-km approach to the target. On our flight we made a wide detour to the south because we felt sure no one would expect us from that direction. We knew that in Bengazi fighter planes were stationed, presumably also a small detachment of them in Agedabia, not far off El Agheila, our target. They would not, we hoped, intercept us because we flew without fighter escort. The sun was high up in the sky when we dived, like birds of prey, from 5,000 meters altitude on the British outpost on the Great Syrthe. Our bombs whirled up a lot of dust, that's all we could see. No visible defense by AA fire could be noticed. All the same we lost one of our crews. On our return to our Bir Dufan camp we were enthusiastically received. The Italian radio interception station had listened in to the report of the Chief of the British High Command in Agheila,

saying that more than 40 armored scouting cars had been destroyed in our sortie. It was the first successful counterblow General Rommel had expected from us.

The next attack was flown by Major Enneccerus and his II/Stuka 2 while we flew the 800 kms back to Trapani to pick up new bombs. Our ammunition supply did not function at that time. The distance to be covered in either direction was 1,600 kms. The next day when our attacks were to be renewed we had to cover another 1,000 to 1,200 kms. We thus proceeded in turn for a number of weeks. In the last sortie flown by my Gruppe against a British division advancing south of Bengazi, which we had attacked in low-level flight, we lost five planes in a surprise attack by "Hurricane" fighters.

So far to this phase of the war after this campaign in North Africa it lasted for only 6 weeks during the war for my group and me. We were called to be involved in the Balkan campaign. I think it is not so relevant that we should cover the Balkan campaign. It was short enough and there was nothing exciting to report.

Moderator: Thank you, General. Are there any comments from the panel? From the audience? It is 12:15, and we have a very short movie provided by General Russ.

AFTERNOON SESSION

General Bruce Clark: Thank you, gentlemen. I find myself in a quite difficult situation to talk as a ground combat soldier who never jumped out of an airplane. My experience in the war has been riding in an L-4 artillery plane--although I spent several hundred hours in that--so when they talk about diving straight down in Stukas and things like that, I am a little bit lost. So, I hope that you will give me the tolerance of being 78 years old that I am allowed to use the perpendicular pronoun. Jimmy Carter never talks without the perpendicular pronoun. He starts every sentence with it, and I think you get more votes if he would once in awhile say "we", but I don't know how to advise him. I have jotted down a few things here that I would like to touch on very lightly. The tank was developed in World War I originally by the British to cut down the terrific losses that came about in trench warfare. After the war, in the National Defense Act of 1920, the tank was made a part of the American infantry and remained with the infantry until 1940. Its development and tactics and everything were relegated to the infantry. The infantry concept of the use of the tank was that the tank moved at the speed of the walking infantry and the infantry walked between the tanks. That was a concept of the use of tank. There were people that did not like that, and I have a letter here from one of them because after World War II, I gave a lecture to the National War College on the tactics and use of armor. It was published and a gentleman wrote to me and this is what he said: "Patton and I publicly and earnestly expanded similar ideas on the service ... (as I have put on the use of armor). Such a doctrine is so revolutionary as compared to World War I practice that we were threatened with court martial. Our championship of the basic principles which

you so rightly support were anathema to the high military officials of the day." Initialed "DDE". I will give the Commandant a copy of this document. If you want to have an Eisenhower room, you should have a copy and what he said about armor. But Patton, van Vorhies, Chaffey, Bairds--those people were all cavalry men and they had little more idea of mobility than the foot soldier and they formed in 1930 the mechanized regiment which was ultimately turned into a brigade, and which in 1940 I joined as a brigade engineer and activated the first armored engineer company in the Army. That is how I got started in armor. They were armed with the same tank as the infantry tank, but their TO&E called it a combat car instead of a tank because, legally, they could not call it a tank. I was in an outfit that did not have any tanks; it just had combat cars. George Marshall, about April 1940, wanted to determine who would run the armored force of the American army, and he directed that a maneuver be held in Louisiana between the 1st Infantry Tank Brigade from Ft Benning and the 2nd Mechanized Cavalry Brigade from Ft Knox. We have some people in this room who were present. The maneuver was won by the Mechanized Brigade. George Marshall, who had been Commandant of the Infantry School, took the tanks away from the infantry and gave them to the armored force, and on 15 July 1940 we created the armored force and the First and Second Armored Divisions with General Chaffey as the Chief of the armored force, and then we went on from there. Before the war was over we had activated some 16 armored divisions plus

some special tank battalions. So the concept of the tank slowing down to the infantry was changed to the infantry speeding up to the tank. That was a basic change of concept that took place in 1940 in the American Army. Now the infantry speeding up to the tank required an armored personnel carrier which was started out with a half track, and then we fought the war with half tracks which the infantry rode in. We find ourselves today in great argument over an infantry fighting vehicle which many of us think is a coffin for infantrymen, and I think that is what they are teaching in Europe. But then a lot of people think that the infantry stays in that vehicle and fights out of the porthole and do not leave it. There are those two schools of thought. It has not been resolved yet. I belong to a school of thought that says the safest place for the infantry is deployed on the ground taking advantage of the folds in the terrain. I happen to belong to that school and maybe in the next war we will prove to be wrong. I am not sure that the Russians agree with that. That is the background of the tank. Chaffey set up a flexible division in which he had two combat commands and a reserve command. His idea was that the battalions would be rotated through the combat command and get back every once in awhile for a day or two so they could be broken down and maintained and get their breath back before they went again. We have done away with that, and we have three combat commands now, and there is no way in war where our tank units ever can get out to have a day's stand down and do maintenance. I think that is basically wrong. All you have to do gentlemen, is to look at how we play football. When I played football in college, we had teams that played 60 minutes and only eleven men. Now we

have at least four teams that are in and out. Even with that the Redskins do not win all their games. But we have four teams that go in and out because a football team that plays sixty minutes-- and I have been on such a team--in the last 30 minutes their butts would be dragging and they could not go a mile a week. If you fight tank units every day and never give them a stand-down period, they gradually come down to half-speed or less. That is a problem of handling personnel that I think is important.

I would like to make one or two comments on the movie this morning. Of course it was designed to prove a certain thing. The enemy they were attacking did not have any aircraft as far as I could see. They talked about combat outfit, and there were no combat engineers among them. Colonel Abrams, who was one of my tank commanders--and we have here a Colonel who used to be a platoon leader in his tank battalion--never would move without a platoon or more combat engineers with him. He would never move without them. If you study history, the percentage of combat engineers in our army has gone up 2 percent each war since the Revolutionary War, and it is going to go up because equipment is getting heavier and we are having more problems, so you should not overlook the combat engineers. Another thing, the tactics of the enemy they were attacking were not approved by Bruce Clark, because if they had been, the enemy would not have seen them and then you would not have any movie. One thing that we are going to have to find out early in the next war is the vulnerability of the helicopter. The helicopter is an awfully vulnerable piece of equipment. It is not fast--60, 70, 80 miles an hour--and I think that anybody

that can go to the moon can come up with a piece of equipment to keep the helicopter from flying. However, my helicopter friends tell me I am wrong, so maybe I am.

We have to get down to the fact of what is the purpose of all warfare. The purpose of warfare is to impose our will on the enemy. When do you impose your will on the enemy? All warfare is characterized from the beginning by complete disorganization--nationally, militarily, everything is disorganized. The person who wins is the person who keeps the disorganization from becoming disorganized. The purpose of the tank is psychological more than military, if you can separate the two. If you have tanks behind an enemy force, the psychological impact on the people that have tanks behind them is pretty severe. I can give you a historical example of that. When the Third Army got to the Moselle River, my division was leading and my combat commander was leading the division. The Moselle River was defended around Nancy by three German corps. I never attack strength if I can run around it--that is my tactic--and I went all the way across France doing that. We moved to the left about 40 miles, bridged the Moselle River and crossed it and went 40 miles beyond, and I was flying over the top of my column which was led by Colonel Abrams. I said, "Abe, if you turn around the next corner about 20 miles down here, there is a German town with 250 German vehicles in it. I want you to turn the corner and go like hell and destroy it". We destroyed a German corps headquarters and took the corps commander prisoner. What happened to

the three German divisions that we were behind? They disintegrated and they came back to the rear a platoon and company at the time, and my tank platoons that were covering all roads destroyed them. Combat command tanks behind a German corps destroyed it. I bring that out to show the psychological thing of warfare. It is easy to forget this. You cannot put that through a computer and come up with a number. You cannot put that through a computer and come up with morale. Napoleon said, "Morale is to the physical as three is to one". You cannot put through the computer and evaluate training; you cannot evaluate teamwork. The army concept of fighting is always based upon teams, not on individuals. A man who flies an airplane all alone--he is the only team aside from the maintenance back home, I guess. Your basic concept of army combat is teamwork. You cannot evaluate leadership and ability to command. You cannot evaluate esprit, you cannot evaluate tactics, nor can you evaluate support from home. When you lack from home, gentlemen, the branch of the army that feels it first is the infantry. When you study Vietnam you will find that is true because they lacked support from home and people felt it first in the infantry. Now, if you will agree with me that when we come out and say how we compare with the Russians, we only add up those things that can be turned to numbers. There was a study by Dr Perry of Deputy DD in the last three or four months in which he said we are superior to the Russians 18 to 12. I wrote to him and I said, "You left out 60 percent--you did not cover any of the intangibles".

Well, his answer was, "How do you do that?". I do not know how you do it, but that does not mean that we can neglect it. Some two years ago, there was a big football team that won the Big Ten championship and went out and played the Rose Bowl and were licked 35 to nothing. They both had 44 men on the squad, they both had just as good shoulder pads, just as good shoes, just as good knee pads, just as good equipment, they had so many weeks of training, and they had a good reputation. Why was one licked 35 to nothing? You could not put it in the computer could you? It was these intangibles, and those are the things that we have to remember, and we must not let the developers say we can develop equipment that cancels out these intangibles. That is a problem that we face in development.

Let us go back to the tank just a minute. The tank has what I call, and what I learned from General Patton, three weapon systems. One of them is the big gun, another is the free machine gun--the .50 caliber or something like that that is free to be used by the tank commander--and the other, the tracks. I appeared before some DoD people and I talked to them, and they said, "General, there is nothing we can evaluate in a tank except the kinetic energy that comes out of the muzzle of the big gun". And I said that the big gun ranks in my tank tactics last of the three. The biggest weapon on the tank is tracks. That is what gives you mobility. Without mobility you just have a stationary pillbox. Let us look at the big gun. On our tanks during the war, we had attached to the outside of the tank just as many boxes of .50-caliber

machine gun ammunition as we could carry, because inside of your tank--even the modern ones--you only have 50, 60, 70 rounds, not many more. Not many of them anymore have anti-personnel rounds. The tank commander in my command never fought buttoned up. He never closed down the hatch. He always fought in the open. He fired that .50-caliber machine gun into every place there was a danger of a bazooka player, or a TOW, or anything else. In other words, he reconnoitered by fire a pace ahead of him all the time. You cannot do that with a big gun because you would be out of ammunition by 10 o'clock in the morning, and we have never learned logistically to be able to replenish the ammunition or the petrol in a tank before nightfall. We have to do that in the dark in the woods, mostly by hand carrying over hill from the roads. That is the environment of the battlefield. It is your tracks that enable the tank to get places where they cause consternation to the enemy, and your good tactics are the tactics that get them there. They do not win by going straight ahead. I do not think in the next war you will ever see a tank stopped in the open without being under cover. Another thing that we are doing; the tank platoons in the next war will have only three tanks instead of five. I have studied the roads in Germany to learn which stretches were such that you could deploy a five-tank platoon widely enough without bunching them up, and it is only between 10 and 15 percent of the roads of Germany. And so, we are going to a three-tank platoon, and there are several good reasons for it. In World War II, a platoon of tanks cost \$200,000. In the next war, a

platoon of three tanks is going to cost \$3,500,000. Let us see how much you can shoot me down on what I have said.

Question: Under the doctrine of the 24 hours continuous combat, how do the Russians replenish ammunition and gasoline?

Answer: When I broke out of the beach at _____ with my command, I said at 4 o'clock in the morning, "I'll be out of gasoline tonight". And he said, "Bruce, don't worry about that, we'll take care of you". And that night I was in the city of Rheims halfway across the West Peninsula as dry as a bone, and I did not have any gasoline for two days. Fortunately, the Germans did not know about it. A tank without gasoline, gentlemen, is not much of a tank. The first question I would ask the Russians if I were able to talk with them is how do you breed men who can fight 24 hours a day without stopping inside a tank where the claustrophobia is pretty thick. I have advocated recently to DoD that they put duplicate tank crews in Germany. You know what they have approved? One extra one per tank. I do not think that they are any more wizards at handling human beings than we are. How many days, 24 hours at a time, could your troops who are well trained stand it?

Colonel Leach: Sir, I remember we went 84 to 90 days around the clock, and that meant doing our own maintenance, doing our own security watches at night, making the attack the next day. Those were 24 hours and that meant never a decent night's rest. That meant 30 minutes here, an hour there, at the most, because the crews had to secure themselves and maintain themselves and fight

the next day. We did not always stop at night. For example, in the Battle of the Bulge, we moved 35 miles from _____ to _____ to link up at Bastogne.

General Clark: There is only a limited amount of ammunition that you can put in the shell of a tank, and it is getting smaller and smaller because the ammunition is getting bigger.

I moved into the Battle of the Bulge in the afternoon of 17 December. I, with a combat command plus the equivalent of another combat command attack--one division--withstood seven German divisions for five days straight, day and night. They drove me back 10 or 15 kms, but we were still going. I can tell you men that I had companies that went into that battle with five or six officers. They were walking just picking one foot up in front of the other and would not go a mile in a week. I keep pointing out that you have to plan to keep that drive in there. A tank that is dead on its feet and a crew that is dead on its feet is a million dollars worth of stuff that is not doing much for you. In Germany today, I will bet you we do not have a tank with a crew that has been together without being changed for a month. Some people are talking about going down to a two-year enlistment and that will make it worse. The problem that we face, gentlemen, is personnel. During the Battle of the Bulge one of my tank outfits had lost 175 crewmen out of the battalion. I went up one night when the replacements came in from the rear. I tried to say something cheerful to the men. I asked one of them standing there when he left Ft Knox. He

said, "General, we ain't never been to Ft Knox". I said, "Where did you learn to be tankers?" "We ain't never seen a tank." I said, "This is interesting. Where did you get your training?" He said, "We came from Camp Croft, an infantry replacement center". I said, "We attack at daylight tomorrow morning, and you're going to be loaders and drivers and gunners. You've got from now till tomorrow morning to learn. Good luck to you". Next morning we attacked. Are we developing equipment which we can do that with now? The answer is, "No". We cannot take a green man right off the street and in six hours attack the Russians with him. That is the kind of equipment we are developing. When I told that to a group of people in DoD just a little while ago, they said, "General, we never thought things like that happened on the battlefield". My next question was, "Have you ever been on a battlefield?" The answer was, "No". Not one of them had ever had the environment of the battlefield. People that do not understand the environment of the battlefield are the ones that are producing our equipment today. In your material, there is a handout that I will not spend much time on, "The Problem of Defending a NATO in Case of a Conventional Warsaw Pact Forces Attack". What we have in Germany today is about one-half million Americans--soldiers, airmen, dependents, State Department, and other such people. The Russians have the capability of attacking with a superior force at the point of attack, at the point they want to select, and at the time of day they want to select, and at the season of the year they want to select. We are prohibited by law from doing anything

but receiving the first attack. That means that we have to absorb the first attack. Down at the bottom of that thing are the three phases that are generally agreed to which NATO will defend. The Germans are not wholly in accord with it because they like to have us defend on the border and not lose 1 foot of West Germany. In the first 36 hours of the Battle of the Bulge we did that. We lost a little over two divisions the first 36 hours and we had 8,500 men in one division surrender in one body. Confusion got so disorganized that Eisenhower relieved Bradley of command at the end of the third day, on 19 December. He gave the command to Montgomery. Manteuffel, in writing me a letter on the subject, said it was because Bradley let the confusion become disorganized. Montgomery, regardless of what you think of his personality, was a master of fighting against odds. Much more so than anybody we had in the American Army. We had taught in our schools in the American Army that we always have odds in our favor; all we have to do is attack. But we learned we had to do different. I think we have learned now that we are going to have to accept a superior force in the initial stages of any war in Germany. The question that comes up is, "Does the American force in Germany or NATO need reinforcement?" I could not find anybody two years ago among 70 NATO officers that I spent a week with that would agree without reinforcement they would not have to use tactical nuclear weapons. My next question was, "If you use tactical nuclear weapons in Germany, will it escalate to strategic weapons?" I wrote that to Dr Brown, and he wrote back and said this is an interesting

question, but I did not expect him to say any more. I proposed this question to several audiences that I talked to on it. "If the Russians cross the border and at that time announce they will not use tactical nuclear weapons unless or until NATO does," would the United States release to use the tactical nuclear weapons that are in Germany? Nobody can release them but the President. How many of you think the President would release nuclear weapons under those circumstances? Of over 30,000 people that I have asked that question, less than 10 percent said he would. I do not know the answer. I brought it to the recent Chairman of the Joint Chiefs and asked him the question, and he answered me by saying this is a \$64 question. Do we have any more questions? Yes sir.

Question: I am Lieutenant Colonel Campbell. I am an Army student here at the National War College and I would like to ask you or anyone else who would like to add to your answer a question about personnel; a follow-on to the remarks you made. In the infantry which I remember we can identify easily after training some people who have a knack for shooting and some, despite good training, do not get to a superb point in their training. For the main gun of the tank, that is a little more critical. It would be very useful for us if we could identify, prior to training, hopefully, people who have a knack for becoming good shots with the main tank gun. Based on your long experience in dealing with this sort of issue, do you have any tips as to where we might begin

to look to identify soldiers who have an aptitude for that sort of thing?

General Clark: I have never given any thought to that for the reason that your tank crew is a very fluid organization. I have never seen tankers fight buttoned-up. In World War II, we had three or four different kinds of ammunition in our tanks. We traveled all the way across Europe with a round of white phosphorus in the tube in my command. That enabled us to fire the first gun and sense it. It also enabled us to screen a dangerous spot. That has been taken away from us now. We fought World War II with the Germans who had a superior tank--the Mark V tank was superior to ours, his armor was superior, his gun was superior. We licked it with white phosphorus in tank-versus-tank battles. In a tank-versus-tank battle where we had about 70 tanks on each side and fought for two or three days, we drove 18 German tanks off the battlefield with the motors running. They had been hit with white phosphorus which had trickled down in and the crews had left. The two other things that come to the problem of Europe. Assume that we need to double in the first 30 days and I had a General Officer in my house this past week who came over to me to talk with me about what I'm talking to you about. He said we're going to have to do more than double the personnel in the first 30 days. The next question is, "How do we do that?" We don't have the strategic manpower to do it by far. Then I said to him, "How many casualties would you have in Europe in the first 30 days

of a Russian attack?" Our experience has been in the Battle of the Bulge-- we lost about 80,000 in about five weeks. The next question is, "How do you replace them?" You are not going to do it with a volunteer army. Do you know that the divisions in Germany today are short 1,000 men? Do you know why? They have given a manning level that fits the amount of troops they have. If you went to the First Infantry Division today and said, "We will move you to Germany in ten days notice", what percentage of the TO&E of that Division would go? (Audience: About 75 percent). That means that they arrive in Germany 2,000 or 3,000 replacements short the day they arrive. Where are we going to get them? They are not available unless we break up divisions in the United States. I asked Max Taylor these questions, and he practically said we could never win another war with a volunteer army. We have got to sell that to a lot of Congressmen.

The third thing is, in the Battle of the Bulge in six weeks time we had 80,000 casualties who were killed, wounded, and missing. My guess is the wounded were maybe 50,000 to 60,000 of those. The condition of the medical facilities in the services is pretty poor. Do you know what percentage of doctors they have at Walter Reed today? What about tanks? I talked to a corps commander in Germany. I asked him how many tanks we would lose fighting the Russians in the first month. He said we would have to have 100 percent replacement in the first month. How do we get them over there? The C-5 airplanes we have do not have adequate wings to fly two tanks. What I am leading up to is

our nation is going to have its entire attention talking about the SALT Agreement, and nothing on tactical nuclear weapons is even considered by the SALT people. The SALT Agreement is only on strategic weapons.

Now being an engineer, and I can add two and two and get four, I have forgotten most of the rest of it, but anyway, how many cities would you say that were destroyed in the United States would get the American people to say, "Let's quit". How many cities? How many think five? How many think ten? How many think five or less? Well, that is another Ouija board question. But why do we argue over 1,100 or 900 tactical nuclear weapons when no side will ever fire more than 50? Do you believe that? Well, we're going to wind up now. I have just one thing I would like to do here. I have a book. When I retired from the Army in 1962, an outfit came to me and wanted to publish what I had written on training and tactics, and they published it, and the Germans have republished it in German. Now here is the same book in German. Now the only thing I can read on it is General Bruce C. Clark. I cannot read anything else, but I would like to give this to our visitor. He did not think he was going to come to America and get a book on how to handle men in German. Good luck to you.

Moderator: Gentlemen, we will go ahead and proceed with General Hozzel's presentation--I hope with interplay and comments from the audience and from the panel. General Hozzel.

General Hozzel: Gentlemen, let me make a short remark. I am a bit unhappy that I am forced to give my presentation by reading it. I hate it. If I could give my presentation in German, it would have been quite another scene. Free statements are much more effective. You know it yourself. But now we have to take it as it is and please excuse.

At the end of September I received from General von Richthofen a telex informing me that I had been promoted, with effect from 1 October 1941, to the post of Commodore of the Stuka Geschwader "Immelmann" (StG 2).

I returned to my old Geschwader where I had served as Oberleutnant in 1937/38. To myself, the young 31 year old major, it was an unheard of mark of distinction which made me almost feel slightly uneasy. The Geschwader had pinned much glory to its colors in the campaigns against Poland, in the West, in the Balkans and the Battle of Crete, particularly since the beginning of war against Russia by the destruction of the Russian Navy in Kronstadt. Some of the crews could look back to some hundreds of sorties. In addition, a number of officers had received the Knights Cross in recognition of their outstanding bravery. One thing was clear to me. A severe standard would be applied to the new commander. A young unit commander was supposed to be an excellent pilot capable of guiding his unit in the air, the first in combat, and the last to disengage from the enemy--like the Prussian cavalry commander at the time of Frederick the Great leading his regiment

into battle with his sword drawn. No leader of a flying unit could gain recognition from the troops under his command except by setting an example in action, and by his own morale. This was the spirit handed down from Prussian-German history, taken on by the Reichswehr and passed on to the Luftwaffe by the young generation of airmen trained by Reichswehr officers. It was this spirit that lived in the Immelmann Geschwader. The mere name of the famous fighter ace of World War I was a pledge, an obligation. Strictest discipline was observed. Oberst Dinort, then 42 years old, and two young Gruppenkommandeure did not tolerate any negligence in behavior, dress, or anything related to discipline. It was the style in which I had received my training as Fahnenjunker (officer cadet) in the 2nd Prussian Artillery Regiment.

After a short briefing I officially took charge of the Geschwader on 16 October. It consisted, at that time, of I and III. Stuka 2 was to be organized in the winter in East Prussia. The Battle of Wjasma had been fought and the German armies were advancing to Moscow. At that time the Geschwader had about 70 JU-87s, operationally ready, which was 70 percent of the required strength of about 100 aircraft. The advance of the Army had made comparatively rapid progress. The air transport units were very busy supplying spare parts for planes and motors which, with the technical equipment available on the front, were overhauled for new combat sorties. Subsequently, a number of airplanes had to be withdrawn from service and taken back to the repair hangars at home because of

necessary overhauls of airframe and motors. That took much time. The supply lines became longer the more the lines advanced to the East. As in the previous campaigns, the Geschwader was subordinated to the Eighth Air Corps commanded by General von Richthofen who, because of his outstanding achievements, had been promoted to Generaloberst, a four star general. At that time he had under his control one Stuka Geschwader with JU-87s, this was mine, one fighter bomber Geschwader with HS-123s, one fighter Geschwader with ME-109s, one bomber Geschwader with JU-88s, a long-range reconnaissance squadron, a short-range reconnaissance squadron, and, also, telecommunication and logistics support. The headquarters were actually under the command of Luftwaffe 2, which was an army level, at Smolensk headed by Fieldmarshal Kesselring, but had much freedom of action in decisions about which sorties were to be flown in support of the army and the destruction of Soviet supply units near the front line, such as movements of troops and supplies by railroads and highways.

The first sorties under my command began. Then we come to the situation as it was in front of Moscow in the late fall of 1941. The Geschwader had transferred to the area east of Wjasma.

Let us return to the situation as it presented itself on the Moscow front in late fall of 1941. The Geschwader had transferred to the village of Kuleshevka, east of Wjasma. The German troops were still advancing. A number of armored units had already crossed the Moscow-Leningrad railroad line near Kalinin. In

coordination with the other units of the Eighth Air Corps, the Stuka Geschwader "Immelmann" supported the army units by bombs and fire from aircraft weapons against Soviet defense forces who fought a delaying action, trying to stop the German advance. The operation orders from the Corps were directly phoned to me or the Geschwader adjutant by the Deputy Chief of Staff of Operations, the Chief of Staff, or by the Commander himself, in accordance with maps at a scale of 1:300,000, and in dependence on a grid square system. This was mere routine between Corps and Geschwader. Target according to grid square, ammunition load, number of aircraft to be employed, time of attack. The latter was fixed only if it was to be synchronized with the ground attack. Normally, the sortie was to be flown as soon as possible. As a rule we had the following ammunition available:

- 500-kg bombs with and without tank busting heads,
- 250-kg bombs with and without tank busting heads,
- 250-kg flamm bombs (similar to Napalm, presumably a kind of oil-gasoline mixture),
- 50-kg bombs and, of course, MG and tracer ammunition for low-level attacks with aircraft weapons.

The normal ammunition load comprised:

- One 500-kg or one 250-kg bomb below the fuselage and
- Four 50-kg bombs below the wings.

The Geschwader made, in the first place, sorties against troop concentrations and against troop movements on railroads and roads. We also attacked gun emplacements. At that time tanks appeared

in isolated numbers only, in small packs, just to harass the advance of our troops. The weather was still quite dry in October. In November, rains set in and the mud season began. This greatly retarded and finally seriously endangered the advance to Moscow, also our logistics.

In November the Geschwader rushed forward, transferring to Gorstovo, a small town on the Moscow River. 10 kms north of Moshaisk, about 100 kms west of Moscow. The spearheads of the army units had reached the western suburbs of the Capitol, and our soldiers were for the first time able to see Moscow streetcars standing at a terminal station. All of us were still sure of victory, even somewhat overbearing, not knowing what kind of winter was ahead of us. Our Generaloberst hovered in his Fieseler "Storch", equipped with a radiophone, over the Russians as though they were flocks of sheep, directing single Stuka and Schlachtflieger units to targets spotted by him. With a fabric-covered and slow courier airplane, the "Storch", he showed a boldness which bordered practically on foolhardiness. He was lucky though, and never received a direct hit on his solo flights. He would get away every time. The news of their general's boldness and bravery soon made the rounds among the units. He was a shining example to all of us. His courage carried us along; every pilot did his utmost.

Every day Richthofen called on his units in his "Storch", unannounced. It was his way to keep the unit commanders, Kommodore and Kommandeure, on the alert.

By the end of November the weather had turned wet and cold, but there was no snow yet. I was just returning from a sortie with a number of planes, in the region east of Kalinin. Having made an intermediate landing for refueling on the Russian air base of Kalinin--then controlled by the Germans--I saw some Russian tanks approaching the field and opening fire. Unfortunately we had no bombs left to defend ourselves and had to take to flight in all haste. Shortly after, having landed at our Gorstove advance airfield, I learned that Richthofen had just arrived there. Listening to my report in the best of spirits, he finally told me, "I expect the Kommodore of Stuka Geschwader 'Immelman' (meaning myself) to land with a Stuka Kette on Jaroslavl airport and to occupy it the moment our first motorcycle riflemen infiltrate the town". The town named is situated in the Volga bend, 300 kms north-northeast of Moscow. This goes to show that even at that juncture a high commander of the Luftwaffe took quite an optimistic view of the situation! In giving this order, Richthofen wanted to demonstrate quite openly the excellent cooperation between Army and Luftwaffe. He wanted to make it clear that the units of the Eighth Air Corps would at any time operate at the foremost front, before the spearheads of the Army. This should strengthen the confidence of both the Army and the people in Germany in the fighting power and the quick power of reaction of the flying units.

Then, all of a sudden, Russia's "General Winter" came over us. It was getting colder and cooler, the mud froze, vehicles got stuck

and could no longer be moved in any direction. It started snowing. The units of the Eighth Air Corps had to camp, unprotected, on the ice-coated open fields in front of Moscow. The advance of our troops came to a halt. It soon changed into a Napoleonic retreat, as we could recognize from the air during our last sorties in the Moscow area, much to our dismay. Our Geschwader could get only a small number of planes into the air per day. The preheating units for the engines had got stuck in the frozen mud far behind our lines. We gathered wood, preheating the engines over open fires to get them started. The fighting capacity of the Geschwader rapidly declined. The most urgently needed spare parts for motors and airframes were flown in by JU-52s. The other units of the Corps were handicapped too. The Soviet Air Force was given an unheard of chance to inflict a crushing defeat on the concentrated German Army and Luftwaffe units, unable to move as they were. Oddly enough, practically nothing happened, although the Soviets had their planes stationed in heated hangars around Moscow and could have taken off to attack us several times a day. To us it was a miracle. In fact, it can, in fact, only be explained by the inefficiency of the Russian Air Force Command, a state of affairs we could observe practically throughout the Eastern campaign. I would, however, warn against negative conclusions from this about the modern Soviet Air Force. For more than 30 years it has had time to learn from its failures in World War II. I am sure it has learned its lessons. The same applies to the Soviet Navy.

In the extensive forest regions north and south of the Smolensk-Moscow highway, it teemed with scattered Soviet troops and partisans who were a constant threat to the German army units withdrawing in the direction of Wjasma. Nothing but the highway itself was under German control. It could only be kept open with great difficulty.

For the Geschwader "Immelman" it was now high time to think of its transfer to the west. Newly formed Soviet units pressed forward in the direction of Moshaisk and so threatened the unit bases of the Eighth Air Corps whose fighting power had been reduced to practically zero because the supply of fuel, ammunition, and spare parts was interrupted. We just had to wait for a change in the weather which would allow us to get our unit of about 40 airworthy planes into the air. On 24 December 1941 our time had come. Richthofen ordered our transfer back to the temporary air base of Dugino, immediately west of the Wjasma-Rshev highway and 30 kms north of Wjasma. The temperature was about freezing point, light snowfall set in. On our flight it was extremely difficult to distinguish the snow-covered ground from the white-grayish haze of the sky. It was in fact, IFR weather. The trouble was that our JU-87 was not equipped for blind flying. The aircraft was, in fact, fitted with IFR instruments for flying through layers of clouds but could not be directed via radiophone. The JU-87 was merely equipped with a radiophone (FuG 7) by which inter-aircraft communication and radio communication with a ground

station was possible over a distance of 80 kms. Beyond that the ground station could address the Geschwader or respond to it in the air up to a distance of 200 kms without knowing, however, whether it had been heard. This offered at least the chance to divert a unit in the air to another objective whenever the situation had changed during the approach flight. In this way the attack of I/Stuka 1 against the Brest-Litovsk citadel could be stopped in the last minute during the Polish campaign after it had already been taken by our troops. We were, consequently, left to our own resources in visual flight. Even in very bad weather we had to depend on our skill in locating our aims by flying closely above the treetops. Flying in Russia was, moreover, made more difficult by the fact that maps available often did not check with geographic realities, a most dangerous and irritating situation. When visibility was poor, we followed the run of railroad lines, highways, and waterways, putting up with detours. We were confronted with such weather conditions on that Christmas Eve when we transferred to Dugino. I ordered flying in Ketten with the express order to be guided by the Moscow-Wjasma and Wjasma-Rshev railroad lines so that no one should get into danger in bad weather. When we landed at nightfall in Dugino, seven planes were missing. We never saw them again. The commander of a Schwerm had obviously ignored the order to use the railroad lines as a navigation aid. This made him lose visibility in the snow flurry. He made ground contact and was wrecked with all the planes following him. It was a sad Christmas Eve. The distressing

idea of our troops in retreat weighed upon all of us in Dugino. For the first time we were seized by the thought that this might be the beginning of a disastrous end. A comparison with Napoleon's army simply suggested itself to us. History repeats itself.

Dr Stolfi: General Hozzel is talking about combat in Russia from about October-November-December 1941 and something that is interesting is wintertime operations, and he has been talking about operating at 58 degrees north latitude in fairly cold temperatures. Something I think you will find interesting is that the winter of 1941-42 in the Soviet Union and in central and eastern Europe--from information that has come to light--was probably the coldest winter in the recorded history of Europe, and that history goes back to a weather-keeping station in Holland for about 240 years at that time. Now it is 2-3/4 centuries. Something that is interesting is that the weather they faced was probably the worst in a quarter of a millenium in Europe. Now, there is a mass of scientific data that show this beyond too much doubt. Any conditions that they faced should be caveated by the fact that this was an extraordinarily cold winter. The Soviet Union in that particular winter was much colder than it should have been, and it was a lucky break for the Soviets that it was so bad and that the Germans were slowed down that much. The average temperature of Moscow in January--for 69 years at that time--was 18 degrees above zero Fahrenheit. That means that on an average day the temperature would go up to 25 and drop perhaps to 13. For the January of 1942, the average temperature was 9 degrees.

The Germans were caught by an extraordinarily bad winter. The interesting thing is that they managed to survive not too badly in the worst winter in the recorded history of the European area. There may have been worse winters 500 years ago, but nobody had the recording instruments at that time. There is anthropological evidence that about 500 years ago the Baltic froze over for a couple of years and wolves came down from Scandinavia and ate people in the north German villages. Nonetheless, the winter of 1941-42 was exceptionally bad.

General Hozzel: From what was left of the Eighth Air Corps, "Combat Unit Dugino" was formed under my command. The unit now consisted of about 30 JU-87s, 20ME-109s, and one reconnaissance Staffel. From the east and north the enemy brought pressure to bear on Rshev. We flew nuisance flights from morning to night, attacking Soviet troop movements and gun areas with bombs and aircraft weapons all the time. Our targets were marked via radiophone by air liaison officers in the front line or by ground signals given by the troops. Our attacks took place in Ketten by slant range dives. We dropped our bombs from altitudes of 500 to 1,000 meters. Each plane, attacking three to five times at least, released its splinter bombs weighing 50 to 500 kg and fitted with impact fuses. Each sortie was concluded with precision fire from its aircraft weapons. Thus we kept permanent contact with the enemy, by two to three Schwaerme, alternately by five to seven aircraft, while the other planes were refueled

and loaded with ammunition on the ground. In Dugino the units were supplied again in the usual way. Heating devices were available. There was no shortage of ammunition, fuel, or rations.

In spite of most strenuous efforts of the Army fighting delaying actions, a Russian armored spearhead succeeded in reaching the environs of Dugino and threatened the air base. All sorties were now made "on our own account", to hold the airfield. Our sorties were short, lasting not more than 15 minutes as a rule. We started, attacked, landed, loaded, and took off again. Some of the Russian tanks had advanced almost to the fringe of our field but were warded off by antitank guns (PAK) and heavy AA fire. Thanks to the excellent teamwork of all available forces of Army and Luftwaffe, it was possible to beat off the foe. Dugino was saved.

Moderator: Gentlemen, General Hozzel will now summarize and perhaps give some of his recommendations. We will endeavor to close by four o'clock.

General Hozzel: I will give some recommendations based on my experience. Though the A-10 aircraft is considerably faster than the JU-87 was, it may well be suggested that in combat missions it should make use of some of our former tactics. Its higher speed compared with the JU-87 is certainly a plus-point when it has to curve away quickly from the flak range, and when countering enemy fighters. I remember the film we saw on the A-10 and I was amazed at the speeds of the A-10 in curving out of the area. On the other hand, for slant range attacks against tanks, the

lower speed of approach of the JU-87 of approximately 350 km/hr was just right because the pilot had sufficient time to aim and fire (or bomb) and for getting closer to the target without any risk of colliding with it. At a higher speed of approach the time of the gun effect is shorter because the attack must be stopped earlier. The ideal aircraft for close air support and tank killing should be able to vary its speed for the slant raze attack while it could more quickly escape the flak range. Having referred in my report to the breaking down of Stuka and Schlachtflieger units into Gruppen, I would also recommend an adequate distribution of forces of the A-10 units. On the basis of the present-day unit structure of two Staffeln for each Geschwader comprising a total of 50 aircraft, sorties with Staffeln of 25 planes each for the protection of specific front sections against a breakthrough of tanks simply suggest themselves. The advanced airfields of those Staffeln should be located as near as possible to the front and be uniformly stocked with ammunition, fuel, and technical equipment permitting, under quickly changing conditions, quick bounds of the Staffeln parallel to the front, from one base to another. The airfields should be equipped with a ground command responsible for the flying operation services, for antiaircraft defense and for the direct protection of the base against assaults. If necessary, the technical personnel of the Staffel should also be employed for airfield defense. Responsibility for all operations in the air and on the ground should rest with the Staffelkapitän who also acts as commandant of the post.

The Geschwaderstab should be set up on an emergency airfield about 50 to 100 kms behind the front. It should be responsible in every respect for the supply of its Staffeln employed at the front and should be provided with the necessary logistic facilities such as reserve aircraft, spare parts, technical equipment, maintenance staff (or repair hangar), rations, field dressing station, etc. It should be the duty of the Geschwaderstab to maintain the operational readiness of the Staffeln at such a high level that an optimum of sorties can be flown every day.

In order to avoid unnecessary delays, target direction should be given to the Staffeln directly by the Air Corps or the Air Division. In exceptional cases, for example in the event of threatening breakthroughs of tank forces, target direction should be given directly by the air liaison officer of the Army Corps involved or of the attacked army divisions. Here again it is made clear that this measure is of a temporary nature without implying any subordination.

As far as target designation on the battlefield is concerned, I would recommend the employment of such air liaison officers (preferably experienced pilot officers) in the front line who can direct the flying unit to the target by radiophone, by flare, or other visual signals.

From the foregoing it can be seen that this concept excludes the Geschwaderkommodore, the Commander of the flying Gruppe, and their

staffs from the direct tactical command of the Staffeln. Their intervention would just give them the function of a relay station. It would be a loss of precious time, might delay sorties and, in turn, result in losses. Any status thinking would have to be out of place. All that is needed in such a situation is quick and effective action. The wing staffs will be quite busy in keeping the Staffeln in a high state of operational readiness all the time. Hence, a steady and close contact with them will be imperative. Moreover, the Geschwader will intercept the sortie orders and so keep in touch with events. The Kommodore and the pilot officers of the two staffs should accompany the Staffeln in turns, so as to obtain direct impressions of the situation on the battlefield.

By the end of each day the Staffelkapitane are to report to the Geschwader the number of sorties flown, their successes, losses, and how they judge the situation.

Several times a day the Kommodore should make intermediate reports to the Air Corps or to the Air Division, summing up the reports of the Staffeln to a general report, concluding with his own judgment of the situation which he is to submit to the Corps (the Division) as a final report (also to be transmitted by telephone beforehand).

For permanent advice and guidance of the operations staffs of the Army, general staff officers of the Luftwaffe with combat experience should be stationed with the army groups, armies, corps, and divisions so as to counteract any unrealistic notions of

operational possibilities of flying units, and to contribute to a better understanding between Army and Luftwaffe. In this connection, I remember how an ill-advised commander-in-chief of an Army group at the Eastern Front on his return flight from the front, having an intermediate landing on the emergency airfield of a Schlachtgeschwader, ordered the Kommodore to appear before him, then reproached him furiously to have stayed with his Geschwader on the ground instead of being up in the air, although there was fair weather at the front. Without listening to the Kommodore's explanations he put him under arrest there and then and carried him off to headquarters. It turned out that the unit could not take off for a sortie because of a sudden change to foggy weather in the front area. The Supreme Commander of the Luftflotte, having to cooperate with that particular Army group, found it quite difficult to free his Kommodore from the custody of the enraged army chief.

The flying units should be fully briefed about anything that may be coming up to them in wartime. Absolute priority should here be given to tank fighting, in view of the alarming conventional superiority of the Warsaw Pact in Central Europe.

I think it absolutely imperative to carry out joint exercises on training ranges of A-10 squadrons with the tank units of the Army. During the exercises any tactical situation imaginable on the battlefield should be tested, such as final assemblies of tanks behind the front, tank camouflage (under haystacks, in barns,

under trees, and in wooded areas) and breakthroughs of tanks. In this way workable offensive tactics and techniques can be tried out and developed in flight. During such field exercises much attention should be given to any possible defensive success of the potential enemy by bringing into play the mobile air defense, the AA tanks, and by evaluating the simulated results achieved by direct or near hits. The Russian is a master of camouflage, very inventive when it comes to setting up "antiaircraft traps", and in ambushing. For this reason, some planes should be especially employed in each sortie for spotting and neutralizing anti-aircraft positions.

The approach and departure tactics of attacking aircraft should be well planned so as to avoid any mutual obstruction. It is recommended to test during field exercises attacks in flights of five to seven planes each. The flights should succeed one another at intervals of about 15 minutes which would give each flight a combat time of about 15 minutes, allowing each single plane to take its full load of ammunition right to the target, in several run-up flights. To that end the flight should approach the target in open, wedge-shaped formation, at an altitude of about 500 meters, dissolving the formation into rows above the target area while reviewing the situation on the battlefield. Then the unit commander should start the first attack, taking aim at a specific tank. The other planes are to succeed each other in rows, from right or from left; this

depending from which side, e.g., north or south, the attack was initiated. This permits the forming of a wide offensive front with five to seven planes flying side by side, without the planes obstructing one another when approaching single tanks. After the attack it is advisable to curve in the direction of the friendly lines and not in that of the enemy. This departure brings two advantages. For one, the planes escape more rapidly from the AA range. On the other hand, the pilots come down on friendly territory when having to make a forced landing, or when bailing out. All the following attacks of each flight are flown in the same way until the next unit appears over the battlefield. In this way one flight will succeed the other throughout the day until the complete destruction of the enemy. This kind of tactical procedure will not be without grievous losses of the crews and planes, especially during the first few sorties flown.

Contrary to our experience with the Soviet Air Force in World War II, it can be safely said that future Soviet tank attacks will be accompanied by strong fighter groups. Hence, it is indispensable that adequate backing by fighter protection be given to all fighter bombers, particularly those engaged in tank fighting. Everything should be done to gain air supremacy over the battle area.

In conclusion, I may add a few words on the type of present-day fighter bomber pilot. His personality hardly differs from that of World War II fighter bomber pilots. The demands made on the pilot are similar in both cases. He should, after a thorough pilot's

training pass through a course of a School for Fighter Pilots, then be given a full special training as a fighter bomber pilot. In the end an alert, self-assured officer with high reaction capability will be available who will

- master aircraft and weapon,
- understand the cooperation of Army and Luftwaffe on the battlefield,
- have a sure instinct for essentials,
- have a control of things, and
- be capable of acting independently in special situations.

This is the end of my presentation.

Dr Stolfi: I think the point the General made was very important. We asked him the question, "With the close air support missions he ran in one form or another from 1942 to 1945, in the targeting that was done, what were the most important targets that the Germans had to fight when they were fighting against the Soviets from 1942 to 1945?" What the General said was, "It depends on the situation and the terrain. If certain things are going on, you are knocking out bridges maybe 150 kms behind the front lines. If something else, you are knocking out perhaps a road, a culvert, a little closer in. Artillery gave the Germans fits; sometimes you might go after artillery positions that were being built up--unfortunately often well protected by air defense--but nonetheless, the Germans in that situation were forced to go for artillery." As we talked

a little more, he said there was one type of thing you could not ignore. You could ignore some artillery and some bridges behind the lines, but the one thing that could not be ignored was heavy tank attack which was really making gains or when there had been a breakthrough. That could not be ignored. That took absolute and complete precedence over everything else. You might choose to be fancy or nice, but when a Soviet attack is advancing 40 to 100 kms that cannot be ignored, and that is when everything goes up. It does not matter what the air defense is or anything else. The Soviet air defense will probably be pretty well down when the Soviets are making such gains, for any number of reasons-- the air defense is going to be dispersed, the air defense vehicles are going to be left behind--and soon (talking about the Soviets), the one thing that had to be stopped was a serious PanzerDurchbruch (breakthrough).

Moderator: Thank you Dr Stolfi. Gentlemen, it has been a pleasure having you here this afternoon. That concludes the program.

MORNING SESSION

General Hozzel: Yesterday I made a broad presentation from before the war; training as a pilot; the first Stuka units we had in Germany, beginning with I up to 11, then the Poland campaign; the Norway campaign; the last phase of the France campaign; then the Battle of Britain; involvement in air warfare support in the Mediterranean Sea; attacks against warships in the northern seas, in the Mediterranean Sea, and in the Channel; then attacks in North Africa, the Balkan campaign, the Crete campaign. I think this would lead too far astray. The most interesting package for you would be the Eastern Front. The sorties in the Eastern Front should be discussed today. Should we proceed at once with this or would you like to say something first?

Moderator: Mr Opheim has a few comments, then I would like to give a general outline.

Mr Opheim: I just wanted to provide some feedback. It was our observation yesterday in the seminar that the General was covering a substantial amount of information. Recognizing that this group has heterogeneous interests, I want to encourage you to ask questions about whatever sphere of interest you may have as it relates to Stuka operations. My observation was that the General has a tremendous amount of information concerning various aspects of it which will be impossible to capture in his general presentation. We are all interested in making this seminar a free exchange. Our objective is to learn from the General's experiences those

things which may help us look to the future and hopefully the avoiding of the next conflict. With that I turn it over to Dr Stolfi.

Dr Stolfi: I think something that you will find interesting to get things started within the framework which Dave Opheim mentioned. I would like to give a brief historical overview of the General's experiences and suggest certain types of questions within the framework of those experiences. There will be lots of things which will occur to you as I mention things which the General did during the war. 1938 was when the Germans started to develop their first serious dive bomber, the JU-87. The aircraft which preceded the JU-87 was the HS-123 which was pretty old technology--it was actually a biplane. In the mid-1930's, people were just going to high-performance, low-wing, all-metal aircraft which are so common today. An interesting point is that the Germans were heavily influenced by the U. S. Navy as they started to develop their dive bombers. In the early 1930's, Ernst Udet had visited the United States and had been profoundly impressed by naval development of the Curtiss-Wright biplane by the U. S. Navy for dive bombing. The relationship of the Stuka to Curtiss-Wright and to U. S. Navy dive bombing techniques is as close as it is possible to imagine. You might keep this relationship in mind. The JU-87 came out in 1938 and when General Hozzel, who was a lot younger and a lieutenant at the time, went into the war in Poland in 1939, he used this low-wing monoplane which would still look pretty sleek today.

This dive bombing technique they used in the Second World War was a little unusual. We did not emphasize things to a similar degree. Something technical that is important for you to think about relative to questions is that the Germans got what we would consider today extraordinary accuracy in bombing attacks with this aircraft. When we think of bombs today, and the kind of attacks that are made with them, we do not have the kind of accuracies that these people were able to get in the Second World War. The General, for example, talked in terms of attempting in the three-year training program to get their bombs into a 10-meter circle. They were not able to do this on too many occasions. Now, a 10-meter circle represents startling accuracy when you are talking about bombing attacks. As we go into these things and you think of the questions you can ask the General, you might remember those unusual accuracies that they were able to get which put a different flavor on their operations. They seriously attacked tanks, for example, with bombs just before the Stalingrad battle in 1942--about September. In September 1939, the war kicked off and General Hozzel was essentially the senior Stuka officer for operations going from East Prussia into Poland. It might be worthwhile for you to ask questions about Poland because there were some heavy and interesting attacks there. Specifically, against certain Polish fortifications.

The next experiences the General had were the Norwegian campaign. The Norwegian campaign was unique in that the General used dive

bombers against essentially an invading amphibious enemy force. The British and French in April 1940 had launched an amphibious operation against Norway. To a significant degree, the Stuka operations conducted by Hozzel and his people were against a landing force coming in. When we think about air support today and about developing weapons, it is 180 degrees out of phase--we are thinking always about supporting an amphibious operation coming in from the sea. General Hozzel's experience was in attacking an invading amphibious force. It might be interesting to ask questions about that.

After the Norwegian campaign, Hozzel shifted down to France and launched attacks against Cherbourg in late May or early June 1940. What happened there that might be interesting to ask questions about in an industrial sense is that the attacks at Cherbourg were against massive, old style fortifications--a lot of dirt cover, some concrete, things like that. The intriguing point there is that regular mobile artillery of today, including the 155-mm howitzers and 8-inch guns, has no effect against such heavy, old style fortifications. It was necessary for the Germans on occasion to use the large bombs which could be used on these relatively accurate dive bombers. This recurred throughout the war when there were heavy fortifications; some were heavy field fortifications like at Kursk, some were set up at Stalingrad, and then the formal fortifications at Sevastopol. The only thing that would get through those fortifications would be heavy, specially designed bombs.

His next experiences were fighting in the Channel where they met sophisticated fighter opposition and where the Germans did not achieve air superiority. A question here is, "What about attack aircraft in a situation where air superiority has not been gained?" The Germans suffered fairly heavily in their initial Stuka attacks in the Channel.

The next experience the General had was in the Mediterranean. Two major aspects that might help in asking questions are first that the Stukas attacked British naval forces. The Stukas under the immediate command of General Hozzel made the very famous attacks in early 1941 against the British carrier "Illustrious" and came very close to sinking it. The "Illustrious" went into the harbor at La Valetta, Malta, then the Germans met very stiff antiair defenses when attempting to finish off "Illustrious". The situation here was heavy antiair coverage on the ground, not too many fighters up, and the difficulty of attempting to hit a fairly small target.

The next situation was a transfer of about four weeks to North Africa, and General Hozzel ran the first German combat sortie in North Africa by a Luftwaffe unit, and there was ground support under African desert conditions. That was half of his career. After the General left North Africa he went to the Eastern Front. He was there in 1942 all the way through, essentially, 1945--for the rest of the war. In formulating your questions, consider that you have in front of you someone who fought against the Soviets, 1942-1945. There are not any Americans who fought

against the Soviets, and for the period or the kinds of intensity of combat. How many times have you been in a discussion which came to an impasse--"Well, the Soviets would not do this" or "The Soviets would do this in this particular case." Nobody really knows in the sense of immediate experience because none of us have had any experience in combat against the Soviets. What General Hozzel will be able to offer is, "I do not know what the Soviets will do today, but when I fought against them in 1942-1945 in these situations, this is what they did." You have to make the application to the present time, but he can tell you, for example, how the Soviets actually functioned.

Let us talk about what happened in the Soviet Union. General Hozzel went to an extremely important position when he first got there in 1942, and that was the air support element, a ground attack element, in support of the Sixth Army which was making the attack on Stalingrad. This was late summer and early autumn of 1942. He conducted very heavy operations, having at one time 300 ground attack aircraft under his control in support of the Sixth Army at Stalingrad. During the Stalingrad battle, and as the Germans were forced back on the defensive, he was then engaged in very heavy defensive operations against the Soviets, going back to the famous Kursk battle. The Kursk battle was the most important battle probably of the Second World War in Europe. He was engaged in air support operations at Kursk, which was the last major German attack on the Eastern Front.

The time frame we are up to now is July 1943. After that he had heavy experiences in logistical operations, support, coordination, and so on, in the Ukraine for almost a year, then finished his career in Courland. He finished, that is, with combat forces surrounded by the Soviets on the Courland Peninsula. Within that framework, especially his experiences on the Eastern Front and with the way the Soviets operated, there are myriad questions which could be answered. The Germans, for example, operated off sod strips. As a matter of fact, they never operated off hard surfaces. The Germans used enlisted pilots. One question which is important is which targets he considered the most crucial on the Eastern Front--was it tanks, was it bridges, was it industrial organizations, and so on.

This is a quick overview and some suggestions which might be helpful. We might even start with some questions which might have occurred to some of you as I have been talking.

Moderator: Thank you, Dr Stolfi. Do any other members of the panel or the audience have any questions or comments at this time? If not, General Hozzel.

General Hozzel: I would think it useful to give a short overview of how we began in 1939 with the JU-87. My first contact with the JU-87 began in November of 1938 when I was promoted to a "Staffelkapitaen". This group had HS-123s, but was converted to JU-87s early 1939. A new task waited for us. We were to

transform our Gruppe into a real dive bomber group flying JU-87s. We were informed that the first group of JU-87s would be ready to be picked up....We handed over our HS-123s and received our JU-87s, which made an impression on us. We first concerned ourselves with the details of instrumentation, with the hydraulic system especially developed for dive bombing, and finally with the bomb release. Finally, after a few short briefing flights the crews soon felt at ease in their closed cabins. The closed cabin was new to us. The HS-123 was an open plane.

We still had to learn how to control the JU-87 in nose-diving. There existed no Stuka school at that time, but there was the Barth Air Base in Pomerania where a Stuka training Gruppe was being built up within the Luftwaffe's training wing. The instructors first had to get familiar, in test flights, with the new weapon before they could pass on their experience and skill to the other Stuka Gruppen. We therefore helped ourselves as well as we could. We first singled out the crews. Pilot and his backseater--the latter also acting as gunner--had to be a real team; one that had to depend on each other for better and for worse. Hence, each pilot chose his backseater. If after a while it was found that the two did not harmonize, the men were replaced until pilots and their backseaters had found themselves. Some of the crews stuck--or crashed--together throughout the war. As to myself, I can say that my backseater and I have remained friends to this very day.

After all our pilots had got used to the JU-87 and learned to have complete command of the plane in starting and landing operations, we practiced nosediving. In the vast forest regions around Insterburg a bombing ground with target cross and spotting tower was soon installed for us. We approached our target at an altitude of 5,000 meters, extended the hydraulic diving brakes shortly before the target, then making the target move into the bottom window in the cockpit below our feet. When it disappeared at the back edge, we turned the plane down at a dive angle of 70 degrees. With the gas shut off, the plane quickly gained speed by its own weight, whilst the diving brakes kept it at a steady pace of 450 kms/hr. We aimed through a reflector sight keeping the whole plane in the center of the target and allowing for velocity and direction of the wind with the aid of the right lead angles. A continuously adjustable red marking arrow was mounted on the altimeter, set to local altitude above mean sea level, whereby the required bomb releasing altitude could be set. When passing that altitude in the dive, a loud and clear horn signal was sounded, warning the pilot to press the bomb releasing button on the control stick and to pull out the plane. By pressing the releasing button we also automatically actuated the hydraulic recovery device which aided the pilot, under the heavy G-load encountered in steep dive recoveries, in pulling out of the dive. The normal bomb releasing altitude was close to 700 meters. Experienced pilots would also venture down to 500 meters in order to increase the bombing accuracy. This, however, was the minimum pulling out radius to

clear the ground in time. Below that there was no hope left as shown by the sadly remembered Stuka disaster of Neuhammer where a practically complete JU-87 Staffel crashed into the ground because of late recovery.

After we had obtained some mastery in nosediving the JU-87, we practiced bomb throwing during dives; first with cement bombs, finally with live ammunition until we found our bombing accuracy was satisfactory. This meant that our bombs had to be dropped into the 10 meters circle of the target cross. A high bombing accuracy in nosediving was, in fact, the criterion of the Stuka weapon as compared to bomb dropping over wider areas from level bombing. The Stukas were, therefore, predestined for fighting pinpoint targets; preferably hangars, aircraft boxes, barracks, arms and ammunition factories in the enemy's back country, and also bunker lines, artillery positions, tanks in the battlefield, and the like. Diving with and without bombs was part of our daily routine. Besides, we also began our unit training in Staffeln as combat flying practice with the whole Gruppe. We drilled after the model of the Schleissheim Fighter Training School, going through the whole fighting program described below. This increased the maneuverability of our pilots. They had to become part of the plane. This included starts and landings on short, bumpy emergency airfields. Occasional crash landings could not be avoided. This preliminary training proved most useful in anticipation of risky landings in unknown regions in the following war.

That training phase was followed by combat fighting practice in squadron units and in given tactical situations as were to be encountered in wartime. This included directing the crews to the target, briefing them about weather conditions, the ground and the air situations, AA emplacements, replenishment of ammunition, fuse setting, the way of taking off--single or in flights--starting order, unit leader, code designations, forming-up altitude, approach route, approach altitude, signal of attack, direction of departure, forming-up during return flights, altitude of return flight, landing order, subsequent discussion, preparation for new sorties. In this way we welded our Gruppe--now renamed 1/Stuka-geschwader 1--into a unit always ready for action. It was not described before. To explain, most of the Stuka pilots, in building up this weapon, had run through a fighter pilot training school of three months.

Moderator: General Hozzel, I saw several people who appeared to be extremely interested in particular points. I wonder if this would be a good time to see if we have any comments from the panel or questions or comments from the audience. General Pope, did you have any comments or questions at this time?

General Pope: No.

General Riling: I would like to know more about what your back-seater did.

General Hozzel: The backseater had the task to protect the plane and crew from being attacked by fighters from behind. He had a two-barrel, high-velocity machine gun with a rate of fire of 1,200 rounds per minute. The pilot also had two guns in the wings with the same velocity so he could attack if necessary as well as the backseater.

Question: Did he have any function during your bombing attack?

General Hozzel: He had to function to observe the air area during the dive--are we being attacked by fighters or not. The other task was radio operator in order to make contact with the ground station if necessary and to hear what the ground station could order if necessary. To add to this point, it might be interesting how the radio installation was--it was very, very poor. The radio contact with the ground station reached only 80 kilometers. The ground station could reach us for a distance of 200 kilometers, but never knew whether we had heard the message. I remember one specific case when I was with my group on sortie to attack the Citadel at Brest-Litovsk. At taking off time all was "go", but when we were 200 kilometers from the ground station the radio operator received the message that the target was in German hands.

Question: Did you wear a shoulder harness as well as a belt, and what was the reaction of the backseater--how did he like this routine?

General Hozzel: Terrible thing; I did not know what he had to suffer. We were strapped in with shoulder straps--the backseater as well. The backseater sat with his back to the dive, a terrible situation, but one can become accustomed to it.

Question: Why an altitude of 5,000 meters enroute to the target?

General Hozzel: We began with that altitude. Later on it did not matter, 5,000 or 4,000. In many cases we began with 6,000. If antiaircraft defense was very heavy, we tried to come in as high as possible. Coming in at 5,000 we had a certain time possibility to dive in the right direction to the target. It takes a time until you attain the right angle of 70 degrees which was necessary to be as accurate as possible. It was necessary to have enough time to dive into the center of the target and have the right angle.

Question: Two questions about accuracy. With regard to the 10-meter circle, does the 10 meters refer to the radius or the diameter? Second, to the best of your recollection, during training exercises what percentage of hits were achieved within that circle?

General Hozzel: In the first time of training, our scores were very poor. Most of the bombs were 20 to 30 meters from the center of the circle. What we aimed at was to achieve hits in a circle with a radius of 10 meters from the center. The mass of our pilots achieved this in the last training period before the war. But you can imagine a difference diving with accuracy and hitting the

target without anyone shooting at you from the ground. When you get fire in your face it is quite another situation.

Question: I realize that in combat you would not achieve such accuracy, but in my own experience, our own Air Force supporting us never achieved any accuracy anything like that.

Question: General, you were there for quite some time. Can you tell us what percent of the time you had to cancel sorties because of the weather and what your experiences were with the weather?

General Hozzel: In yesterday's presentation I told of our experiences in Norway and other areas. The cancellation of a sortie was in the Norway campaign. It was the first sortie with my group. The target was a warship convoy consisting of one battleship, a warship, and two cruisers....destroyers. This was a lot to do without any fighter cover possible at that time. The range from the base to the target was about 1,000 kilometers. The convoy was offshore 200 kilometers. We flew at about 250 kilometers per hour with bombs under our bellies, so we needed more than three hours to come in the target area. During these three and one-half hours the weather had gone bad, so at the end we flew at 100 meters over the open sea. What to do? You can imagine my feeling. What if the cruisers came up suddenly at a distance of 1 to 3 kilometers? We had to drop the bombs in the belly of the ships. Fortunately, it did not happen. It would have been terrible. We would have done it, but I had already decided to cancel the sortie. It was

high time to regain the shore because we were at that time four hours over open sea, and we had to fly one and one-half hours to get back to Stavanger. It was completely unclear whether Stavanger was in German hands or in British hands or in Norwegian hands. We had to land anyhow. This was the first time that we cancelled a sortie for weather. And the second time it happened in the western Mediterranean in a similar situation when I was to attack two British cruisers which had attacked the harbor of Genoa in broad daylight. It happened just the same. I was to attack with the Italians. The Italians had cancelled the sortie for reasons of bad weather, and I reached the steep coast of Monte Carlo and flew at 50 meters height and 1 kilometer visibility. We had to break off and cancel the sortie. I remember those two.

Question: Can you recall the percentage of times when sorties were cancelled?

General Hozzel: I repeat--I remember those two times and no more. There was a reason to break off. I personally led and flew 336 sorties in that war, from the beginning until March 1943, in several war theaters.

Question: Did you make only one dive bombing attack on a sortie, releasing all of your weapons at one time? After you had released your weapons, did you stay low or did you climb rapidly?

General Hozzel: When we made a classical Stuka dive attack from 5,000 meters on a pinpoint target, we released the bombs at the

end of that one dive. To answer question number two, in order to get out of the antiaircraft area quickly, we had a lot of speed at the end of the dive and tried to egress as quickly as possible. They could not follow up at treetop level at that speed. This was the reason we stayed down, not high. The first Stuka idea was to climb again. This caused us heavy losses.

Question (General Casey): What was the minimum altitude at which you began a dive bombing attack?

General Hozzel: The lowest altitude to fulfill a classical Stuka dive bombing was at least 2,000 meters for a very experienced pilot. Otherwise, they should do it at least from 3,000 meters. An experienced pilot could do a real Stuka dive bombing from as little as 2,000 meters. There was, as you can imagine, very little time to come onto the target line.

Dr Stolfi: The JU-87 was armed, beginning late in 1942, with two 37-mm cannons specifically for attacks against Soviet tanks. When this same aircraft was used in gun attacks on Soviet tanks, those attacks were made on occasion with ceilings as low as 30 meters or 100 feet, according to one of the general's top pilots, Colonel Rudel. With guns, the quickness and agility of that particular aircraft permitted it to do something quite amazing. Of course, it was a combination of things--the guns gave you a quickness of response with no fragmentation, and the Germans were able to fly under some very low ceilings. That 100 feet was extraordinarily low, but it has consistently come out in our talks with General

Hozzel and others who flew the aircraft with the guns. One other thing I think you will find interesting. On the dive angles, an experienced pilot flying this aircraft would increase his accuracy as the angle increased--80 degrees, 90 degrees. In the famous destruction of the Soviet battleship "Murat" on September 10, 1941, in the Finnish Blight, Rudel, who happened to knock out that battleship, dove in a 90 degree dive angle in order to knock out the battleship. So, the aircraft could actually be used at 90 degrees, and it is duly historically recorded that he dived at 90 to make that successful attack. An interesting followup on that is that as the pilot pulled out on that attack, he fell unconscious; the aircraft steered itself away apparently. His backup man, Corporal Scharnoski, was apparently a little tougher, and he remembers as he regained consciousness the backup man saying, "Sir, we have hit and we have knocked out the battleship." It blew up with a huge column of smoke.

Question: How did you acquire the target in the window in the bottom of the plane, and how did you follow or track the target with your sight from that point onward?

General Hozzel: When we approached the target, say at 5,000 meters altitude, can you imagine a loose unit formation? I ordered by radio, "Ready to attack, brakes out." All put their brakes out for the preparation for the dive. To get the target into the window it was necessary to fly at altitude and straight away, on line. Then, without looking to the antiair fire--this you had to stand--until

the target came to the forward edge. Then the pilot looked until the target disappeared at the back edge. At that very moment we began the dive by diving over the nose. It was a remarkable feeling. Then we went into the 70 degree dive. Then we had the right direction to the target automatically. The next function was to aim the target over the sighting cross in front of me. So, allowing for wind speed and direction, we kept that point on the middle of the target.

Question: How did you estimate wind?

General Hozzel: We had a certain view of wind direction and wind speed given to us by our weather agency. But how the wind really was at the target--(laughter).

Question: Did you ever attempt level bombing, say during lower ceilings and visibility?

General Hozzel: No. No level bombing, not at all.

Question: Yesterday you mentioned some 30 degree bombings at some times.

General Hozzel: I will try to answer, but first I want to add something to the previous question. Since the wind we had been told about was not the one encountered, we turned in the dive into the wind.

Question: When you had a number of units diving simultaneously, how did you coordinate target selection?

General Hozzel: If we had only one target, we would never attack it with a group of 50 aircraft. Normally we had several targets. When I had an order to attack a group of targets, I took the whole group and started with about 40 or 45 planes. Coming over the target area, I made the distribution by radio, "You attack this target. I with the first Staffel will attack this target." The distribution was made in the air over the target. If we had a target with a certain area to cover with the whole group, so that we did not strike each other, we formed the group into squadrons in a row--row right, row left, so that we could not destroy each other. We came down like a string of pearls; one plane after the other. I was normally the first to attack, as a commander, and I pulled up again, if the antiaircraft fire was not too heavy, to 800-1,000 meters so I could see if my crews were brave enough to release the bombs as deep as possible.

Question: Discuss the survivability of the Stuka during the classic dive bombing attack, with an approach at 5,000 meters and an air speed of 450 kilometers per hour, which appears to give an extraordinarily long tracking time for the antiaircraft batteries.

General Hozzel: In the western theaters, for example in Norway attacking warship convoys, we experienced AA fire at 5,000 meters. It would be thought that we would have heavier losses. On the

sortie I speak of, it happened 300 kilometers off the Norwegian coast. I was sure I would lose about 5 or 7 of my crews. The reality was we lost only 2 in the heaviest antiaircraft fire, and sank two warships of 15,000 tons. As you know, a battleship has heavy AA on board. We came out with two losses. In the eastern theater, quite another situation. I had the heaviest losses over Stalingrad by AA fire, not by fighters.

General Pope: How did you coordinate with advancing German armored forces and infantry?

General Hozzel: Normally, when the ground attack was en route, we were fighting forward of the spearheads. The targets were given by air liaison officers sitting in the most forward tanks of each division. They used radios and we had contact with them by radio. They used a scale of 1:300,000 with a grid net on it; the same as the armored reconnaissance air liaison officer. We had contact; my crews heard it with me. They called out the targets to us and asked if we had it. They also shot flares to signal their own positions. They had panels to mark the forward lines, and our armor often had flags on the top--black, white, red; easy to see. In this close air support we never flew at 5,000 meters. We came in, for example, at 1,000 meters or it could be 500. In slant angle attack, we tried to throw the bomb into the belly of the tank tank. This we succeeded in doing after a time of training.

Question: You mentioned earlier that there were two wing-mounted machine guns on the Stuka. For what purpose were they used, against what targets?

General Hozzel: To answer this question it is well to clarify one point. There is a difference between a classical dive bomber attack and a close air support attack with the JU-87. A classical dive bomber is what I have described. A classical air support attack has nothing to do with a classical dive bomber attack. It is a slant angle attack, beginning at an altitude of say 500-1,000 meters, at an angle of about 30-40 degrees. To answer why we had machine guns. These were for attacks in close air support. We released the bombs individually--the heavy bomb on the first pass, each of the lighter bombs on subsequent passes. Then if we were to attack trucks or troops in assembly, we used the machine guns, making 5 to 7 passes per aircraft. We never used the machine guns in classical dive bombing attacks and made only one pass at the target, existing then to escape antiaircraft fire.

Question: In your close air support missions, what was the range of the mission and the frequency? Also, could you expand on your comment that it was easy to acquire targets--what about camouflage, terrain masking tree cover, and so on?

General Hozzel: In the Poland campaign we had sorties which had a range of 200 kilometers to the target and 200 kilometers back. Another example, when we attacked in Poland, which was only 80

kilometers from our base, we made three attacks with the whole group. About the turn around--4 hours. In the battle of Stalingrad we were 40 kilometers from Stalingrad, and the overall target was 50 kilometers long and 12 kilometers wide. This meant at that time, for example October, the weather was still dry and warm; we could fly from the morning to the evening, about 10 hours. We could make about 8 sorties with each aircraft. Normally, in good weather we needed 45 minutes for each sortie, from taxiing out, takeoff, assembling, approaching the target, releasing the bomb, flying back, landing, taxiing back to the box, refueling and rearming--45 minutes. With reserve tanks under the wings, we could fly 6 to 6-1/2 hours. I told of attacking a British convoy over the open sea. This was a flight over 2-1/2 hours from the base to the target and 2-1/2 hours back, so we had about 800 kilometers total; a range of 400 kilometers one way.

Question: An axiom of warfare is that the attacker should have a 5 or 6 to 1 numerical superiority over the defending force. Yet, in Operation Barbarossa, at no time did the Germans have more than about 25 percent as much armor as the Russians had, yet the Germans were much more successful than the Russians. Do you consider that air power had a significant hand in that, or how do you explain it?

Dr Stolfi: Let me give you a few statistics by way of background. The Germans attacked at 0305 in the morning of 22 June 1941. The Germans had 3,200 tanks. This included tanks down to the little

Panzer II which is about 9.9 tons, and we would not even consider that a tank today, so I am including 9.9 ton tanks of which they had maybe 20% of their total strength of the 3,200. The Soviet figure has stayed firmly at between 20,000 and 24,000 tanks of roughly equivalent value to the German tanks. When the Germans went in, it is an historical fact that they had the nerve to attack the Soviet Union with 3,200 tanks while the Soviets had 20,000-24,000. In the air it was just about as absurd. The Germans attacked with approximately 1,800 combat aircraft. The Soviets are credited with 8,000 combat aircraft--this is the lowest figure I have seen. The figure is, I think, closer to 14,000 combat aircraft. There are some other comparisons I can give you, but those two are the basics. Tanks are perhaps the most important weapons for ground warfare, and in aircraft it is almost a joke. The Germans ignored any axioms about relative strength. It is historically an established fact that they beat the hell out of the Russians in the first four weeks, and you can make the generalization that what the Germans did to the Soviets in the first four weeks took the Soviets the next four years plus the assistance of the British Empire, the United States, and so forth, to overcome.

General Hozzel: In the first phase of Barbarossa I was not involved. I will nevertheless try to explain why things occurred as they did. I took over my Geschwader only at October 1, 1941, in the Battle of Moscow. What you mentioned happened before, at the beginning of the Eastern campaign. It is right that the Russians had an armor superiority of 1:4; a situation similar to

what we have today. The record could be explained by our coming as a real surprise to the Russians at that time. A year or two later there would not have been any surprise. Now it was a surprise; they were not so prepared. They had the number of men, of armor, but they were not in the position they should have been in when we attacked. They were shocked. In the first days we ran over them. The combined attack from the ground and from the air was decisive, as we did it with steady contact with the spearheads of the armored divisions, the infantry divisions, the quick-marching troops, bombing ahead of our divisions, bombing everything which opposed us. This made the success. Later in the Battle of Moscow, Stalingrad, in spite of the fact the Soviets had an enormous number of aircraft, about 4:1 or more, we were never attacked in critical situations as in the Battle of Moscow when we sat in open icy fields and the Russian air force was in hangars--they did not come. When we attacked one year later, a lot of planes, ammunition, tanks, and so on....Attacking with 120 Junkers in the morning hour, I was prepared to be attacked by a lot of fighters. Nothing happened. Antiaircraft fire, yes, but no losses by fighters. The same at Stalingrad. We had one fighter unit at Stalingrad....they had air superiority. Now and then one came, and he was shot. We could not understand it.

General Pope: A very simplistic example I use sometimes is that if you visualize a brigade of armor attacking frontally, that has the attack power of a battalion on the flank or of a company on the rear. One company in the rear of that enemy is worth a whole

brigade in the front. This tells you that tactics and bursting through and surrounding and confusing them is not something you can computerize. It does not come on a computer. It comes in a sense of timing. When you begin to go on minefields that do not have fuzes in them and you begin to see their artillery fires falling on the wrong places--behind you where you were--you are then a step ahead in timing. You have them confused and they are not prepared for it. That is the time that you really can take advantage and numbers have nothing to do with it. If the enemy is confused, numbers have nothing to do with the outcome.

General Hozzel: I would like to add something to your point. Our intensity of attacking from the air was so great, it was so effective, that our unit leader decided whether to attack new targets. He was free to attack on his own decision, having the combat situation before his eyes. This made for a lot of success. Individual responsible decisions from the unit commander in combat.

Question: That still happens today. The Russians have centralized command while the Western forces stress individual initiative. Do you think that is what happened during Barbarossa?

General Hozzel: Yes.

Question: I heard another possible explanation. You are probably the wrong one to ask this. I wonder what you think. In his book, Colonel DePuy said there is something like a superman in the German race in that their ability in planning and waging warfare

was unsurpassed; it was so far above anyone else's in the world at the time of World War II that they were able to be extremely successful. The Germans were at a disadvantage almost all the time and turned it almost always into a victory. Do you subscribe to that--that the Germans at that time were that much above others?

Dr Stolfi: Let me comment on that. It is a complex situation. Let me give a few more figures. In the first four weeks of the war, the Germans got to Smolensk in the center and not far from Leningrad in the north. The first four days of the campaign, Mannstein, with the 56th Panzer Corps in the north made an advance of approximately 210 miles, taking both the road and the rail bridge over the western Fina River where the Russians had a tendency to run a lot of their major operations. This success is staggering. The reasons for it--the Germans had strategic surprise and tactical surprise to a significant degree. I think a special element is some kind of extraordinary independent decision-making at all levels, from lieutenants running platoons up to colonel-generals up to field marshals who were running army groups. There was an extraordinary capability for independent decision-making. In the first four weeks of the war, the Germans got themselves halfway to Moscow and sound historical thesis is that in that first four weeks they had won the Russian campaign. They spent the next 78 days throwing it away when Adolf came into the decision process. Halfway to Moscow, only four weeks into the campaign, what do we do now? I will not delve into that except to give you another figure. In that first four weeks the

Germans suffered about the same number of casualties that they suffered in the four weeks of the French campaign--about 119,000 men in four weeks. In the French campaign they lost about 160,000. The Soviets in the same four weeks lost 1,100,000 men. That is an extraordinary exchange ratio in view of the Germans being weaker. On the other hand, surprise buys you a lot relative to being a basic principle of war. Yet the Germans really took advantage of it. The Germans did such grievous harm to the Russians in the first four weeks of the war that it took them four years to recover, and psychologically they have not recovered to this day from the effects of the first four weeks of the Second World War.

Question: Most of the comments were about German successes on the offensive. Could the General discuss the situation when the Russians went on the offensive in 1943-1944 and the relative impact of the Stukas in these situations. This is more like what we are going to be confronted with in Europe where the Russians are going to have superiority like they had in 1943-1944 in their offensive.

General Hozzel: This situation began in the Battle of Moscow where we had the first feeling something could go wrong with the whole campaign in the Soviet Union. It was in a Napoleon retreat that we suffered in late 1941. It was the same situation as Napoleon had suffered in 1812. It was the first retreat of that war by the German Army. This was the first time where we would

have given close air support to our troops in retreat, but we could not at that time because we were on icy fields with snow drifts and we had no heating facilities. The planes were stuck in the snow so we had to make open fires under the motors to come away with three or four planes each day. Later, in the summer offensive of 1943 when we tried to turn the war in our favor, we lost the battle of Kursk. We hoped to overcome the Russian advance, then we had a two hour retreat which began a two year retreat to Berlin. This retreat was to be covered by Stuka attacks. They did their very best. We had only four Geschwader, twelve groups, at the very best time. We had only one Geschwader for each army group. What is that at the front line of a battle of 2,000 kilometers? What should have been done was to have a Geschwader for each army. That would have stopped the attack of the Soviets with certainty.

Question: It was implied that western forces enjoy a great independence of action at the working level in our ground forces. Is this the case?

Dr Stolfi: I think it is generally agreed to, but it might not exist for any of a number of reasons. There is a stress on independent action, but there is a question to what extent it exists. I hate to use the expression "lip service" because there is more than lip service. There may be developing a fool's paradise relative to the qualitative factor that you are implying exists that is to compensate for numerical factors.

Moderator: General Russ, I wonder if you might comment on the authority given a squadron commander in the context of TAC today.

General Russ: I think there is an entirely different system in peacetime and in wartime. The more you talk about it in a peace environment, the less flexibility a squadron or wing commander has. The classic point here is that the Germans were able to make independent decisions when they had to make independent decisions, when they did not have a command and control system which enabled them to control from far back. They were trained and able to make those independent decisions. I think that conversely the Russians were not able to do that. They were very dependent upon the guidance and when they did not receive this guidance they were lost.

Question: What I am implying is that the presence of the command and control system inhibits independent action. What we should hope for is that our command and control system comes apart in the early stages of the war, thus freeing our men for independent actions.

General Russ: The idea is that it is completely centralized to start with, but for execution it has to be decentralized.

General Pope: In the position I held as commanding general of CENTAG, I had two German corps and two American corps. You ask yourself as an Army Group Commander, "How can you influence the action?" Well, you can move reserves, you can move firepower,

you can move airpower, you can change boundaries, you can perhaps delineate general defensive positions, but you cannot do much more. You have to defend your lines. We tried this TAC computer and the thing just ran you crazy. You would say, "I want to know all about the enemy", and the computer would start and it would go for half an hour and you couldn't shut it off. You would say, "I want a front line trace", and it would give you a fair front line trace, but knowing that, what can you do about it? I think you get high level decisions from Washington, but they cannot detail things. When you get into a dinky crisis, there is where you get all the command and control. For example, when Czechoslovakia was invaded in 1968, I got some of the most idiotic command and control things you could think of, but it was all negative. I was forbidden to fly my Mohawk to look at the troops. I was forbidden to dig foxholes along the Czech border. Ridiculous little things because the national command authority was sitting back in Washington doing minute to minute control of a very miniscule operation. They cannot do it, anymore than I can detail to my German and American Corps commanders just how they fight the battle. It is impossible. You have to make a war plan, then rely on your God-given brains to adjust the war plan, then leave it to your corps commanders.

Comments: The German general staff has always maintained that authority should be delegated to the lowest levels, and that I think has been practiced in the German army and the Luftwaffe from

1870 on and maybe even earlier. However, for the first time in history, when Hitler made himself commander in chief of the German army, that situation began to change. It turned out that the theater commanders, the army group commanders, and toward the end of the war as he replaced good officers with "yes" men, Hitler was even making decisions on the transfer of brigades or on where a corps should stand in a defensive position. So this practice was eroded from the top down in World War II, from 1941 on. In fact, Rommel, right before the invasion of Normandy, could not even move a brigade a distance of 50 miles, and the reserve divisions, which if they had been committed when they were requested to be released, we might have had a different outcome in Normandy. But Hitler would not let Rundstadt move a single brigade.

Question: What happened to Paulus at Stalingrad? He lost 600,000 troops?

Dr Stolfi: No, Paulus lost 290,000 to 320,000 troops. Paulus was given specific instructions to stay in, not to break out. Paulus was not really the commander. Hitler personally appointed himself commander, Stalingrad area. Technically, Hitler was immediately in control. Paulus could have done things, but he got direct orders from Hitler himself, and Paulus cracked under the strain. He was not the right man for the right job there. He was the wrong man for attacking Stalingrad directly instead of using the mobility of the sixth Army to attack Stalingrad indirectly, as by going around.

Question: Did the Luftwaffe attempt to centralize control over the five JU-87 Geschwader in order to use them en masse instead of piecemeal out among the armies and army groups? If not, why not?

General Hozzel: In special situations, as for example in 1943, the last attempt of the German Wehrmacht to attack, we had assembled 1700 German airplanes--fighter-bombers, fighters, reconnaissance. Moreover, all Stuka Geschwader had assembled for this purpose at four places, but only for a short time to break the Russian front. The Russians knew we had 1700 planes assembled, and this was the only time they dared a massive attack by air. They came with 500 bombers. If they had succeeded we would have had a terrible clash with the units assembled there. Our fighters went up on alert and the Russians were stopped. Only in this critical situation had we assembled all the units which we had at the whole front. After this German operation failed, we could not break the Russian front, it was too heavy, too massive, too deeply entrenched. So we distributed all units again from army to army. The Geschwader had no possibility of common guidance any more. For example, Rudel led one group with cannons, and when there was a threat of armor breakthrough at any place, Rudel was called as a fire brigade to prevent the breakthrough. Then another army cried for help and Rudel went there with his special group. He never was in a position to lead the Geschwader. The other groups were distributed just as far. He was a unique combat campaigner; he was exceptional.

AFTERNOON SESSION

Moderator: Gentlemen, we will open the afternoon with a presentation by General Hozzel on the major tank engagements on the Eastern front. There will be a great deal of interest in this particular aspect.

General Hozzel: Gentlemen, I will try to give you some examples of the situation in the Battle of Stalingrad, to give you a picture of the situation in late summer of 1942. My Geschwader were on emergency fields in the Russian steppes--out on a plains landscape, no trees, no bushes. In the neighborhood were other units of the Eighth Air Corps, under whose command we were at that time. There was fighter Geschwader "Udet", there was a close air support Geschwader with Focke-Wulf 190, and a level bomber Geschwader. This was the operational power we had under the command of the Eighth Air Corps at that time. The task was to give support to the Sixth Army thrusting in the direction of Stalingrad. At that time this thrust had come to a stop because of the River Don which runs parallel to the Volga River, building a kind of isthmus between the Volga and the Don. On the Don River was situated the town of Kalalath. The Soviets, knowing our intention to take Stalingrad, had put up a barrier on the West bank of the Don, in front of this town. This barrier consisted of 200 to 300 tanks, and it was the first time we came in contact with such a mass of tanks. The Soviet resistance had clearly stiffened here. Apparently it was intended to delay the

German thrust at Stalingrad as far as possible. The Sixth Army was therefore bound to attempt a breakthrough of the tank position with close air support to be able to cross the Don and push on to Stalingrad. Thus the tank battle started the Geschwader Immelman encountered for the first time a large concentration of tanks. We saw many packs of T-34s, also some older types. The fronts between friend and foe were clearly discernible. It would have been pointless to attack in large groups because our planes would have hindered one another. Instead we detailed one Staffel after another. They approached single tanks in Ketten and from the side, from south to north or vice versa. Each plane looked for its target, flying parallel to its neighbor, at approach angles of 30 to 40 degrees, aiming with the whole aircraft through the reflex sight, at the center of the tank, then dropping 500-kg bombs with tank busting head into the tank's side while making an extremely low pass above the ground. Flame-bombs also proved to be most effective because due to the heat developing the crew was incapacitated while the fuel container of the tank exploded. It was, of course, imperative to react rapidly, to pull up the plane in a split second after bomb dropping, flying across the tank so as to avoid being hit by the explosion of our own bomb. It sounds adventurous but that's exactly what it was. Later, a better method of tank killing was devised. The JU-87 was armed with two 3.7-cm cannons below the wings which led to great successes. In the Kalalath tank battle it was our tactics to keep one Staffel of 9 to 12 planes

constantly in touch with the enemy. Whilst one Staffel still pressed home its last attack, the one following was approaching the target area. Thus the Russian tank forces, being unrelentingly harassed from the air, could not fully concentrate on the ground situation and the fighting of German tanks. When the crew of a single enemy tank saw itself attacked from the air, it immediately started curving so as to avoid the attacker. In doing so it was, of course, unable to fire against our tanks. Seeing that any Soviet tank must have felt attacked along the whole width of our offensive front, our tank hunting strikes had quite obviously a paralyzing effect on the firepower of the enemy tank force. I should not fail to mention here that among the Russian tanks there were also antiaircraft tanks we had to watch out for. We could easily identify them by their vertical barrels. It goes without saying that they were the first to be attacked by us. Yet, there were some of them who fired from camouflaged positions not made out by us in time. Still they scored no hits because of the angular velocity of our JU-87s attacking at a slant dive angle. The speed of our planes was too high for their cannon to follow it.

The tank barrier near Kalalath was finally pierced in a combined effort of Army and Luftwaffe. The way to Stalingrad was open. Within one day only the German armored divisions crossed the Don on a wide front, rushing forward across the isthmus--being about 60 to 80 kms wide--to their strategic aim of Stalingrad while steadily receiving close air support from Stukageschwader.

"Immelman" and Schlachtgeschwader 1. In the evening of the same day the Supreme Command of the Sixth Army was able to report that its armored spearheads had entered Stalingrad from north and south. The Germans felt sure of victory. But soon it was realized that a tough struggle was ahead.

The Soviet Supreme Command was, like ourselves, well aware of the decisive importance of the Battle of Stalingrad for the outcome of the war. It was therefore determined to hold it, come what may. Day and night new forces were brought up from the depth of the vast Soviet territory east of the Volga. By daylight we could see from the air the clouds of dust accompanying the columns of approaching relief troops of the Red Army, crossing the river at night on simple pontoon bridges and infiltrating into the immensely large area of factories and dwelling units of the city which was, in fact, transformed into a labyrinthine fortress. Heavy fights broke out for each block of apartment houses, each courtyard, each factory ground, workshop or cellar. There were serious losses on both sides. The Soviet Supreme Command could, at the Stalingrad front, rely on an immeasurable reservoir of manpower, and drew on plentiful resources of men and material from regions free from any enemy. The manpower reserves of the Germans were, at that time, practically exhausted. Their supply lines, extending over 2000 kms, passed through partisan territory. Germany had her troops fighting on four fronts. The Soviet Union, on the other hand, having to defend one front only, received

logistics support by the convoys of the Western Powers via her ice-free port of Murmansk and obtained all that was needed for the preparation of a large-scale counterblow.

Dr Stolfi: General, excuse me. Perhaps here a comment is in order. The General made a comment which you might be interested in. That was the presence of the air defense cannons which the Soviets had and which they got in larger numbers during the war. A big issue is, can you get a reasonable analogy between the General's experience in the Soviet Union and the air defense systems which exist today. The probability exists, and it is a pretty good one--better than .5-- that the Soviet Air Defense cannon systems in the Second World War were probably more formidable than those that exist at the present time. When you take the ZSU-23/4s, the ZSU-57s, and the other things the Soviets would have left over, my own thesis would be that the air defense cannon systems that existed in the Second World War that General Hozzel and his people went up against would be superior air defense cannon systems as regards the number of projectiles, relative danger, and so on. The thesis runs that the Soviets have inhibited their gun air defense systems by going to missiles. They had a terrific air defense system. To bring that home to you, let me give you a figure which I think you will find interesting. The big tank killer, Rudel, who was credited with 519 immediate catastrophic kills, and who feels that the actual number of Soviet tanks which was damaged by a single Stuka was about 1,500, was asked about a year and a half ago, "How dangerous was it? How

many times were you shot down?" Rudel looked at the audience and said, "In 1944-1945, I was shot down 36 times." Think about that relative to the effectiveness of the air defense system. That is a formidable statistic, and I think that something you would want to think about is the fact that there was an air defense system that was extraordinarily formidable on the Eastern front. On the other hand, there are missiles today which are a different bag. They are very effective in their own ways, and so on, but some of the lessons which are halfway developing here--do not think that the Germans flew in some kind of permissive environment. They did not have the trouble you might have expected with Soviet fighters, but they had a terrific problem with the Soviet Air Defense System.

Comments From the Audience: I cannot let that go by. Commenting on tactical air defense, I am under the impression that the Russians had excellent crews and good cannons, but for the most part during World War II, their guns were fired manually, with manual sights. Now the ZSU-23/4 has a very good radar and makes a tremendous difference in the effectiveness in terms of probability of kill against a given aircraft on a given approach, and so on, if you compare one gun system to one other gun system. In other words, the Soviet AA today, as well as Oerlikon Flakpanzer which we are considering is an excellent system. The first point I want to make is that the AA cannon systems today are much superior to those of World War II.

Dr Stolfi: The fire control is much better. Actually, the ballistics and so forth are not much different. Fire control, absolutely, and that is important.

Comment (continued): The ballistics are different too. We have higher muzzle velocities, we have much higher ballistic coefficients, we have more lethal ammunition--so much progress has been made.

Dr Stolfi: Let me throw out a quick point on that which I think you will find interesting, and it is directly pertinent to what we are saying here. For the APIT ammunition on the very advanced GAU-8 cannon, the average velocity at the muzzle is about 3,215 fps. That is a high velocity cannon; very effective figure. The guns that Rudel had on his aircraft, the 3.7 cm, their muzzle velocity was 3,740 fps--not for a 30-mm cannon, but for a 37-mm cannon. Now those are examples of a German gun and an American gun and a difference in time. It is curious. You have to be careful with that type of figure. Now, with your fire control, grant you.

Comment (continued): I do want to make the point that AA cannon systems today are much more effective than those of World War II. However, the Russians did have a very high density of AA, in smaller calibers, accompanying their armies. We did not have much of a threat. In fact, that is one of the problems still. If we have to fight against a strong air enemy, we are doomed. Personally, I think we are lacking attention in that direction with regard to finding tactical antiaircraft defenses.

Dr Stolfi: I agree. The point I wanted to bring out, which has been modified, is that there was a more dense system which put more projectiles in the air. That is a thesis which holds a certain amount of water. Perhaps General Hozzel can comment on Soviet AA guns. You have mentioned that they actually had tanks with multibarrel antiaircraft guns. Could you perhaps describe the AA defense systems to some degree?

General Hozzel: I have already discussed the fact that we had to face antiaircraft tanks during this battle at Kalalath. The fact is that when we saw these, we attacked them with a flight of JU-87s, say five. So the mass of our planes attacked the regular armor and a little detachment attacked the antiaircraft weapons. As I said already, in the battle of Kalalath we had no losses by the AA armors because they could not follow the targets--the JU-87 in this case-- with their barrels. The camouflaged AA units were dangerous because we could not recognize them in time, and it became a real trap for us--then we suffered losses. A very severe situation came up when we attacked targets in Stalingrad itself. Since we have come to this point, I will report about attacks on Stalingrad.

At Stalingrad, as was mentioned here already, the density of AA batteries was immense. We suffered the highest losses ever in sorties against targets in Stalingrad. It was incredible, but I lost the mass of my Geschwader in a four-month period. Troops

and planes were replaced at once, but those with prior experience in combat were irreplaceable.

Question: Since you had a very high loss rate, can you quantify it in terms of how many sorties and how many aircraft lost?

General Hozzel: It is very difficult to give a relationship between sorties and losses. We suffered about 120 losses. The mass of the Geschwader was lost in the Battle of Stalingrad in the course of four months. Certainly, we flew a lot of sorties in that time, especially when we had good weather. We had on one day 800 sorties flown by the Geschwader. But it is impossible for me to say after so long a time how many sorties we had flown in four months in relation to the losses we had. We had 120 losses, but I cannot say how many sorties we had. On the average, one loss a day. This included those days when we could not fly because of bad weather. Four months, 120 days, 120 losses.

Question: It is interesting that you say that on one day you flew 800 sorties. Could you go on? Were there days when you flew none? What was a good day?

General Hozzel: An average day--five to six sorties for each plane.

Question: A question about the antiaircraft tanks you were dueling. Did you select the pilots and give them any special equipment or special training to attack these enemy tanks?

General Hozzel: No. This we could not do. We were in a combat time and not in a training time. This was the first time that we faced this fact. We did not know before. It came out with the first attack of these tanks that they had anticircraft tanks. When we observed them, we attacked them. There was no special selection necessary. We said, "You'll make it. Go."

I said the Soviet Union received logistic support by the convoys of the Western powers. This is the explanation of how they could build themselves up so strong as they did in that time. The Balkan campaign, originally not taken into account by the German command, and the Crete operation; what a decisive loss of time, men, and material for the campaign against the Soviet Union, which had originally, and rightly, been planned for the beginning of April 1941. The loss of those three months, gentlemen, decided the Battle of Moscow, and then we were in front of Stalingrad. To make the situation worse, a severe winter was ahead of us, similar to and perhaps worse than in the Battle of Moscow. The Eighth Air Corps had meanwhile transferred its units to the region between the Don and the Volga. Geschwader Immelmann took off from an airfield 40 kilometers away from Stalingrad. Our operational readiness had been reduced to 60 percent. The logistical man was haunted with many problems caused by the increased activities by partisan groups in the territories occupied by our army and through which our lines of communication passed. We heard of railroad tracks being torn up by explosives day after day, and of the troublesome repairs. We also learned that transport columns could no

longer move along without being protected by strong convoys. Meanwhile, the partisans had organized themselves in the deep forests. They were under the command of active officers of the Red Army who were landed by plane or at night jumped by parachute. By the middle of October, the weather had become noticeably cooler, yet it was dry and not really cold. In spite of the obstructions of our supply routes, our logistics support was on the whole satisfactorily maintained. The units of both the Sixth Army and the Eighth Air Corps were supplied with all they needed, though they could no longer draw on plentiful resources. In order to support the army in its strategic struggle for the final occupation of the city, reconnaissance planes had prepared an aerial mosaic which each pilot had in front of him in his cockpit when flying sorties against targets in Stalingrad. Likewise, each aviation officer in the spearheads of the divisions had that aerial mosaic map with him. A system of coordinates plotted on the mosaic enabled the aviation officer to indicate to the commander of the approaching Stuka unit by radio phone exactly every target and to direct him to it. Throughout the battle for the city this kind of cooperation was excellent. As I said before, a distance of only 40 kilometers separated us from Stalingrad. This meant that we needed for each sortie a chock-to-chock time of not more than 45 minutes, which included taxiing to the start, takeoff, approach flight, the climb to an altitude of 4,000 meters, target pickup, dive bombing attack, low level flight departure, landing, taxiing to the apron. Each turnaround--a new loading, a short technical overhaul,

checkout-took us another 15 minutes. We were consistently able to fly with each plane about eight sorties from sunrise to sunset. On some days we managed to fly a total of about 800 sorties, as I already mentioned. This was a great feat of our crews bringing effective aid to our army units in their hard struggle against an enemy gaining in strength all the time. Every minute of the day we kept the enemy on the go with Stuka combat fighter plane attacks, continuously harassing him from the air. With our dive bombers, we had first started attacks by diving on the Russians from high altitudes with our sirens hooting incessantly, thinking this would shatter their nerves. Soon, however, we stopped these tactics when we realized that Russian ears were indifferent to those acoustic irritations. Obviously, their nerve structure was much stronger than that of Western people. Here again, I should say a few words about Soviet air defense. For the protection of his troops in Stalingrad, the enemy had a massive antiaircraft arrangement on both banks of the Volga River; also in the city sections occupied by him. They fired at us with all calibers at their disposal, inflicting heavy casualties on us. Most dangerous to us were their medium 20-mm and their larger 40-mm antiaircraft, which at times caught us in dives at altitudes between 800 and 500 meters. Even their heavy antiaircraft guns fired quite accurately to altitudes of 4,000 to 5,000 meters. It is a fact that the Geschwader in its sorties on the Eastern Front, particularly over Stalingrad, suffered its most severe losses by antiaircraft fire and hardly by Soviet fighter planes. Various of our pilots and

their backseaters actually succeeded in shooting down Soviet fighters in the attack. We should not forget that Jagdgeschwader Udet and close air support Geschwader 190, also employed as fighter units, had full air supremacy in the Stalingrad area after having decimated Russian fighters and interceptors. Apart from the Russian antiaircraft guns, we had to deal with another, invisible, though just as dangerous, enemy of our deep diving Stukas. I refer to the trajectories of the artillery projectiles thrown at us from both sides, and which we crossed while pulling out of our dives and on departing. It sometimes could not be determined whether it was an antiaircraft or an artillery projectile that had torn up a JU-87 in the air.

The month of October 1942 passed week by week without the Sixth Army being able to break Soviet resistance in the center of Stalingrad. To make things worse, the fighting power of the enemy, while being far from slackening, was even getting stronger and stronger from day to day. I will here report of a sortie we flew with about 120 JU-87s against a special target in the center of Stalingrad. It was the ruins of a giant production plant in the basement of which the Russians had so firmly entrenched themselves that there was no getting at them from the ground. The only chance to drive them out of their underground position appeared to be a mass Stuka attack. The plant extended from west to east for a length of about 1,000 meters and a width of 50 meters. In the north, the west, and the south, it was closed in by our infantry, but it was open to the east which was enemy territory. The

stiffened resistance of the Soviet combat force stuck like a painful thorn in the side of the German divisions operating there. They could steadily be given logistic support from the east. Generaloberst von Richtofen, the commander of the air force in that area, made us understand that our Geschwader had to do precision bombing so as to avoid danger to our troops entrenched close to the target area. He wanted to watch our sorties, judge the accuracy of our pilots, from his commandpost at the western outskirts of the city. This was indeed a very delicate order. We could not risk making a dive bombing attack from 4,000 meters altitude because of the wide area of dispersion. We had to fly a slant range attack, releasing the bombs directly over the roofs. We had to push the bombs into the target like loaves of bread into an oven, with one plane succeeding the other. We loaded each plane with one 500-kilo bomb with a tank-busting head and delayed action fuze for piercing the roofs. Each plane also carried two 250-kilo bombs under the wings, so each carried a load of 1,000 kilos. Each pilot was fully briefed in accordance with the aerial mosaic mentioned and informed about the sequence of the attack. It was planned to drop the bombs in rapid succession so as to wear down the enemy by endless detonations. The order of the attack was accurately fixed. The Geschwader assembled at altitudes between 1,000 and 2,000 meters in a holding area west of Stalingrad outside the antiair range without fighter escort. From there the individual Staffeln started their slant range approach in the sequence ordered. The Staffskette, having signalled the attack, started first

and dived on its target, dropping its bomb from a very low altitude. Then, pulling our planes around, we left the antiair range in low level flight, gaining altitude west of the city so as to observe the attacks of the planes following us. As on a string of pearls, one plane followed the others within an interval of a few seconds, throwing the bombs on the oblong target area divided up among us. Not one single bomb missed its target. This brought our crews high praises by the infantry in the target area. But what was the result of the whole operation? It was next to nothing. When the division resumed its attacks in order to test the effects of the bombing raid, it unexpectedly met with fierce counter-attacks as though nothing had happened; as if the Geschwader had dropped toy torpedoes instead of bombs.

I reported on this at such great length to make clear that Russian soldiers, particularly those of Asiatic strain, can take a lot of punishment. In my opinion, this has not changed much since.

Question: Would you discuss night operations?

General Hozzel: We did not have night operations at that time with the JU-87--only by day. Late in 1944, when the JU-87 was retired from the mission as Stukas in close air support aircraft, it was converted to a night bomber unit. This was past my time as Geschwadecommandeur. It was not very effective.

Question: At the time when you had the Immelmann wing attacking the tanks just before Stalingrad, you had as many as 300 aircraft under your control?

General Hozzel: I had about 200. I had four groups of JU-87s, and those groups had about 40 to 45 aircraft--about 170 JU-87s, 15 ME-110s as reconnaissance and destroyer aircraft for fighter protection, and 15 Italian Macchis as part of that protection. So I had about 200.

Question: What was your rank at that time?

General Hozzel: A major, in a regimental position.

Question: That was a lot of aircraft in real war, in real combat. That says something about the style. How was it as a major you had control of over 200 combat aircraft in front of the major effort? The major part of the war effort for Germany was where the Sixth Army was. I think it would be interesting for you to discuss how a major got 200 aircraft.

General Hozzel: At the eve of September on the eve of the war, I was a first lieutenant. Then I was commander of a squadron. I was the eldest commander (squadron) in that group. Group was battalion level, and it was led by a major. On the 31st of August, we took off from our base in East Prussia to Elbing, our jumping-off base for the first sortie. I had landed at Elbing; shortly after my landing, the Adjutant of my group commander landed. My commander was 44 at that time. He had the misfortune to fall down the stairs in his house. He had a stroke. He could not come and lead his group in combat. So, the Adjutant reported to me that the Supreme Command of the Air Force in East Prussia had commanded me to be

acting commander of the group. I was an Oberleutnant. I led my group into the Poland campaign. I had the most sorties. I was the commander now, and I had to be the bravest of all, so I did. I was the first to get the Iron Cross. After the Poland campaign I was promoted to captain in the normal way. There were voices raised which said "He is too young. Another senior officer will take over the command of the group." But, there was a general named Kesselring, later a field marshal, and he said "This is not right. This young man has led this group bravely, he has been decorated, the group was successful, leave him the group, why not?" And so I was a commander. Nine months later the Norwegian campaign came up. We had 11 Stuka groups in the whole air force. My group, by chance, at random, had the number one-dash-one. They needed one Stuka group in the Norwegian campaign. They saw the roll--"One-one, why not Hozzel?" So I was engaged in Norway. In Norway we were comparatively successful, and by chance, we sank more than 100,000 tons and at the end we were the first group to win four Knight's Crosses. This was the highest decoration possible at that time. After the campaign in France there was an atmosphere of victory, high mood. They said, "Now we will honor our commanders who have fought the combat." They promoted me to the rank of the command, and this was a major or lieutenant colonel in my case. And so in July 1940 I got a telephone call from the Chief of Staff of the Fourth Air Corps, a full colonel. He said, "Hello, is this Major Hozzel on the line?" "No, he is Captain Hozzel." "No, no. We want to speak

to Major Hozzel." I was a major. Nine months before I was an Oberleutnant. This was not normal.

Now the fact that we were operating in North Africa, the Mediterranean, under the command of General von Richtofen, maybe he became attentive of me. He promised me one day when he ordered me to the Headquarters, "You get no air position in Germany. You will become commander of a Stuka school in Wertheim am Main." This was a regimental position. I was not too happy because I would have liked to stay at the front and have the Geschwader, and I said it. He promised to call me back to the front in three months, but he said, "You will never get a Geschwader. You will get a Group." Ended. Finished. Three months later I had a Geschwader, a recommended position as a major. So it went. So I was promoted to lieutenant colonel in that position. I was just 32 years of age at that time....another person in that position could have done the same.

Question: After the war, after the Russians had taken over, did you ever have the opportunity to discuss tactics with any of the Russian pilots?

General Hozzel: I have never met a Russian aviator, and I have only had a few days with the commander of a Russian air fleet. It was a General Polkovnik, a three star general. He was very, very angry with us. There was no talk possible about why they had not reacted in the Battle of Moscow, in the Battle of Stalingrad.

He was so angry that our Geschwader....you have not heard what had happened. My last position was Chief of Staff of Air Fleet One. The capitulation order was that we, so the Russians said, "You are not allowed to release your units to Germany." This was a break of the order of capitulation. There was no talk possible--they were very angry and said we were guilty and had to suffer. And we suffered for 11 years.

Question (Dr Stolfi): Air defense systems appear to be very effective today. I think that aircraft are still competitive systems for the modern battlefield. There are certain tactics and techniques which make fixed wing aircraft still effective. There is no doubt about that. Relative to the implications of tanks, you must realize that the Germans got excruciating results, with the Rudels and the cannon on the Stukas. That lesson apparently is not very well known. For example, the Israeli Air Force does not give itself much confidence in knocking out Arab tanks. This has nothing to do with the air defense system, but has to do with a moving aircraft hitting a very small hard target. So the Israeli pilots, with whom my experience is excruciatingly intimate and great, have the doctrine that aircraft do not attack tanks. On the other hand, you have the lesson of the Germans--they did it, and very well. When you throw that together with modern air defense systems, I think that fixed-wing aircraft are still very effective and competitive. There are various tactics, techniques, and situations where they can have decisive influence on targets

as difficult as mobile tank targets. I do not think there is any question about that. General, would you like to comment on that?

General Hozzel: Yes. I am of the opinion that we should have weapons as simple as possible and to attack as effectively as possible. We should have bombs and cannons. What other solution would you suggest? As we have seen in the film on the A-10, the 3-centimeter cannon will do the thing as a close air support mission. We will never have a classic Stuka attack again.

Question: It appears the Europeans do not see it the same way. Their doctrine is different in that they see high speed aircraft going down very low using cluster munitions and never attacking single tanks or even two tanks, but just attacking tank concentrations and ignoring the closet portion of the formation. Do you see it different from that?

General Hozzel: Yes, I do. I would say we must do both things. If there is an armor assembly, as in the Battle of Kursk in the summer of 1943, there was a threatening, massive armor assembly preparing a breakthrough. We faced that breakthrough by close air support attack led by a major. This major saw this assembly by chance. He had five aircraft and he attacked at once. And then back as quickly as possible to alert as quickly as possible the whole unit of 30 to 40 aircraft to attack and attack until the assembly was destroyed. The breakthrough was impossible. I am

of the opinion that we should act as simply as possible, as the Russians are. Their weapons function very well for their simplicity. Our machine guns were very sophisticated, but the Russian machine guns functioned in the Battle of Moscow and ours did not.

Question: Did you find the antiair defenses of the Russians to be more formidable at certain times, say right after a breakthrough on their part or right after a breakthrough on your part?

General Hozzel: Yes. In the first battles the antiaircraft artillery was not so intensive. For example, in the Battle of Moscow, we had no losses by antiaircraft fire. Why, I cannot explain. It was not as dense as we faced in Stalingrad. That was the greatest density experienced in the Eastern Front campaign. Similar density was experienced during the battle over the Kuban bridgehead.

Question: As the Russians made a breakthrough, did their antiair defenses diminish?

General Hozzel: Where we encountered armor tank troops. You are quite right. The density of antiair fire was poor. They had some antiaircraft armor in between, five maybe six. The normal AA batteries were not in the breakthrough at all.

Moderator's Comment: That is a very important consideration. In static defensive situations, Rudel said it was suicide to attack Soviet tanks in their assembly positions. Generically, as the Soviets move--and one must expect this, it is not being optimistic,

one must expect it realistically--dramatically, say to the North Sea, there is going to be a separation naturally between the tanks and the air defense system. Take specifically the ZSU-23/4. It is one chassis which has dissimilar characteristics with the main battle tank and it is going to fall behind.

Moderator: General Hozzel has a brief additional presentation, then we will have an eight minute film from Fairchild to wrap it up for this afternoon.

General Hozzel: I want to end with a few words about Stalingrad. At that time, before the final closing in of the Sixth Army, the German Supreme Command still seemed to be quite optimistic. In view of the Soviet supply columns reaching Stalingrad from the north and the east, week after week, some of us were seized with a feeling of depression. On the one hand, the Sixth Army seemed to be quite intact. On the other hand, why did the Sixth Army not take the remaining third section in the center of the city? Somehow, its strength seemed to weaken, though this was only natural after all the experience of the last four months. Reinforcements of tanks, fuel, and ammunition had slowed down. The reasons for this were obstructions caused by partisans, as already mentioned. With the allied Italian and Rumanian units protecting the flanks, would the army be in a position to withstand the Russian counter-offensive now obviously in the offing? Those familiar with the situation had their doubts because two allied armies were not

backed up by an adequate number of armed forces. To make things worse, winter was near at hand. So came the end. Today we know the prescience of imminent disaster would come true, even surpass all expectations. I do not want to repeat the reports on the German debate in that battle deciding the outcome of the war. The Geschwader Immelmann flew out the mass of its ground crews from the pocket by transporting them in the wings and rear cockpits of the planes. As many as about 700 men were ordered to be left behind. They were integrated into the Luftwaffe Field Battalion Immelmann. We never heard of them again. In the ensuing fights for the relief of the Sixth Army, our Geschwader lost a number of battle tested Staffelkapitaen and many a brave crew who had distinguished themselves in hundreds of sorties. Most of them were killed in action in low level flights over enemy territory, in bad weather, by camouflaged Russian antiaircraft batteries. We have already discussed those topics, so I end my presentation with this. Thank you.